TECHNOLOGY DEPT

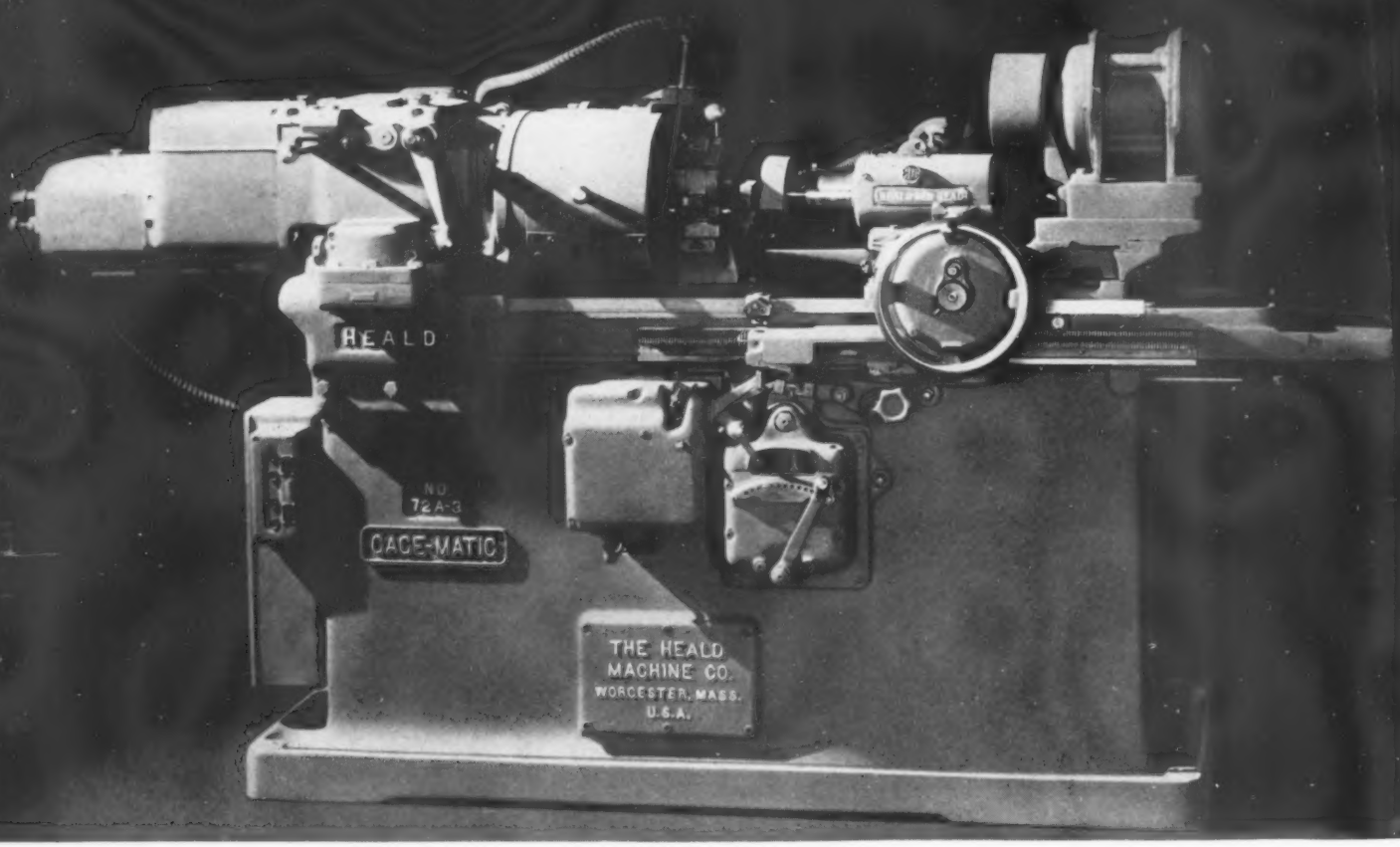
AMERICAN MACHINIST

FEBRUARY 18, 1943

ARMAMENT: Assembly of the Vega Ventura - Page 121

ON THE NOSE EVERY TIME

EVEN WITH AVERAGE OPERATORS



Thanks to Automatic Internal Grinding

You're bound to do better and faster grinding with Heald Automatic Internals – they're so easy to operate even for average operators. In fact, Heald Gage-Matics and Size-Matics almost operate themselves, because they are completely automatic except for loading and starting the machine. Their automatic features include automatic grinding to semi-finish size, automatic wheel truing, and automatic grinding to finish size. As a result, these machines make possible uniform accuracy with minimum scrap and reduce operator fatigue. With such features Heald Gage-Matic and Size-Matic Internals are almost human in operation and literally talk production. They'll talk any grinding job into higher production and closer accuracy. Complete information on request.

THE HEALD MACHINE CO. WORCESTER, MASS. U. S. A.

TECHNOLOGY DEPT.

AMERICAN MACHINIST

February 18, 1943

Feminine Touch—Women in the shops do their part by building planes for our flyers on the fighting fronts

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BULLETIN

American Machinist's Every-Issue "Where-to-Buy" Section Now Discontinued

● Beginning with this issue, the "Where-to-Buy" section which has appeared in each issue of *American Machinist* will be discontinued. This is to conserve paper . . . in compliance with WPB Order No. L-244. However, readers who have come to depend on *American Machinist* for Metal-Working's sources of supply will still be served.

New, Enlarged Annual Directory Still Available

● As you know, *American Machinist* published last month (Jan. 21, 1943 issue) its 30th Annual Catalog and Review Number. This included a revised, enlarged, "Where-to-Buy" Directory listing companies making practically every type of Metal-Working machines, equipment, tools, parts, materials and supplies.

We suggest you keep this Annual handy throughout the year as a buying reference. As a further convenience to our subscribers, we have reprinted the Annual's "Where-to-Buy" Directory, and extra copies may be obtained at no charge upon request any time during the year.

Write READER SERVICE DEPARTMENT • AMERICAN MACHINIST

330 WEST 42ND STREET, NEW YORK, N. Y.

Controlled SURFACE HARDENING

with Gleason precision machine-tool equipment offers these distinct advantages:

direct hardening control . . . simultaneous hardening of both sides of tooth . . . desired penetration with burner speed control . . . same hardening time and depth for each tooth - - automatic speed control maintains uniform hardness on ends and throughout tooth length.

freedom from stress and distortion . . . small section of tooth heated at one time, with rapid heat diffusion through cold gear body, eliminating necessity of liquid quench.

metallurgically correct hardening . . . greatest hardness on tooth sides with gradual transition to unaffected core.

wide range of application . . . two machines cover broad range of straight and curved-tooth bevels, hypoids, spurs, helicals, internals above 24 D. P. up to 120" diameter.

fast, economical operation . . . only two simple inexpensive burners to change . . . short set-up time . . . no subsequent drawing necessary.

Write for our book "The Surface Hardening of Gear Teeth"

GLEASON

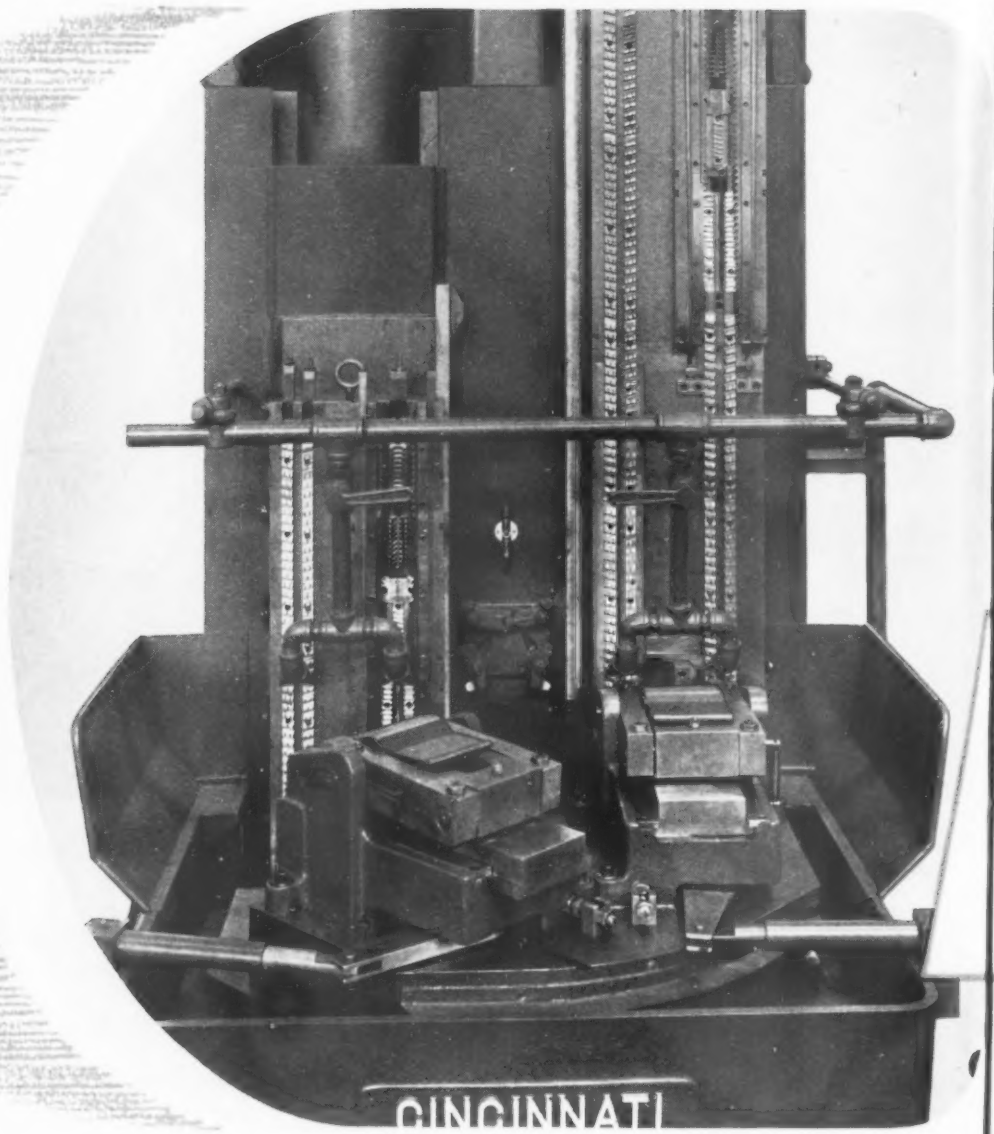
GLEASON WORKS

Builders of Bevel Gear Machinery for Over Seventy-five Years

1000 UNIVERSITY AVENUE, ROCHESTER, N. Y., U. S. A.

ARMY E NAVY

THINGS HAPPEN



CINCINNATI

Navy E awarded March 6, 1942. Renewal Star awarded September 6, 1942, along with Army-Navy E.

THE CINCINNATI

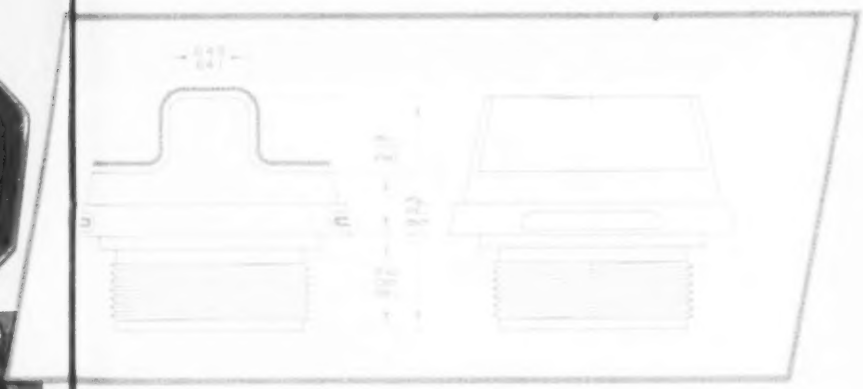
MILLING MACHINES

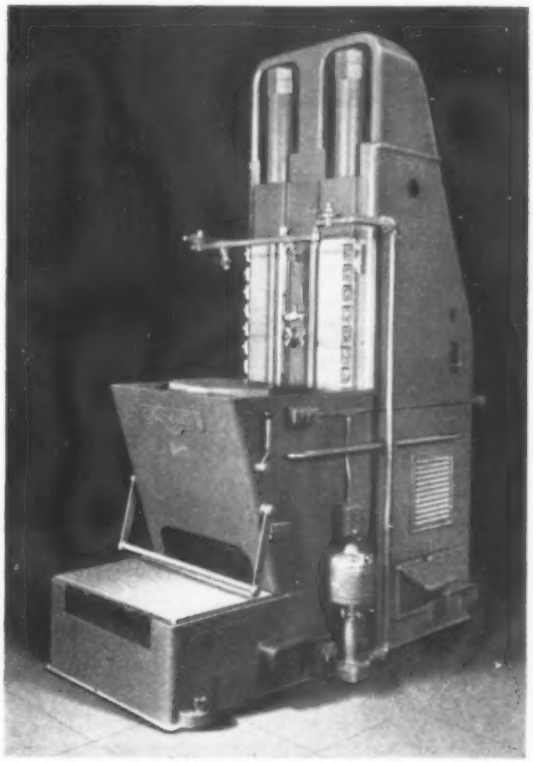
. . when Hydro-Broaches get their heads together

By using a CINCINNATI No. 10-66 Vertical Duplex Hydro-Broaching machine and disregarding the conventional, it was possible to remove four times as much metal on this particular operation. Usually broaching machines remove up to 5/32" stock. For heavier cuts other types of machines are used. But in this instance the performance of the Broach was increased far beyond that generally accepted and at no sacrifice in accuracy.

Here two parts are handled simultaneously. 5/8" stock is being removed in broaching the tang and two wrench slots on fuse bodies at the rate of 306 per hour. This arrangement produces two parts per machine cycle and is a most unusual method of stepping up production.

No doubt, in your own shop there are many parts which could be completed more rapidly by the broaching process. Why not talk to our Field and Factory Engineers about it? They will be glad to make a careful study of your situation and give you their recommendations.





Catalog M-894 covers all features and benefits of CINCINNATI No. 5-42 Duplex Hydro-Broach illustrated at right. This catalog, another official communique from Milling Headquarters, will be sent on request. These and other machines are illustrated in our catalog which appears in Sweet's file.

MILLING MACHINE CO. CINCINNATI, OHIO, U. S. A.

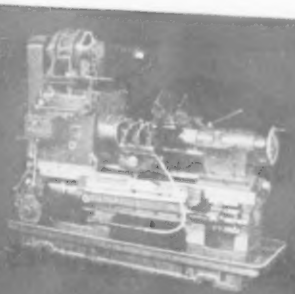
BROACHING MACHINES • GRINDING MACHINES • LAPPING MACHINES

"It was exactly ten o'clock. I know, because I'm sittin' there with my brother-in-law and his wife, and they just got through sayin' it's ten o'clock and they better get home, when suddenly the lights go out. 'That's funny,' I says. 'Yeah, must be something the matter,' my brother-in-law says, 'call 'em up and ast 'em.' So I'm huntin' for the phone, and nearly break my neck when I step on the kid's doll, and then I pick up the phone and there don't nobody answer."

With some such homespun speech as this would many an American commence his version of the Great Catastrophe of 1943 — if by some freak of natural phenomena every electric line in the country should suddenly go dead.

Imagine, if you can, this entire nation without electricity, barely 70 years after the first electric lines appeared. "Brother, I want to tell you that was one hell of a mess," the sidewalk historian would go on to say. And he'd tell how industry, without power for its electric machines, stopped dead. How transportation got tangled, and all communications were out. How food began to spoil, and fuel supplies dwindled, and cities were without water. And how ignorance and fear fanned the growing national panic as the dread spectres, Crime, Famine and Disease swept the land.

Preposterous? Certainly. Yet we can think of no more graphic way of illustrating our national dependence today upon the electrical industry. And that entire industry — with its countless products and blessings — was made possible by a relatively few basic precision machine tools!



FAY AUTOMATIC LATHES

AUTOMATIC THREAD GRINDERS

OPTICAL COMPARATORS

AUTOMATIC OPENING DIE HEADS

GREAT CATASTROPHE OF 1943!

Jones & Lamson was in at the very birth of the Electrical Age in America, and literally millions of different parts, products and machines have stemmed from machine tools designed and developed by this one company.

In the swiftly changing world of today, such a background as this is of great value to American industry. For it means that Jones & Lamson engineers and service men are among the best qualified machine tool specialists in America to assist your own engineers in meeting changing production problems. Call upon them!

JONES & LAMSON
MACHINE COMPANY

Manufacturers of • Universal Turret Lathes • Fay Automatic Lathes • Automatic Thread Grinders • Optical Comparators • Automatic Opening Die Heads

Springfield, *Vermont,* **U. S. A.**

SADDLE TYPE
UNIVERSAL TURRET LATHES

PROFIT-PRODUCING
MACHINE TOOLS

RAM TYPE
UNIVERSAL TURRET LATHES

WAR PRODUCTION BULLETIN

FELLOWS 7A-TYPE GEAR SHAPERS ARE SETTING RECORDS IN TURNING OUT

Automotive Transmission Gears

FOR MILITARY USE

(a) Precision Quality

(b) Fewer Rejects

(c) Lower Costs

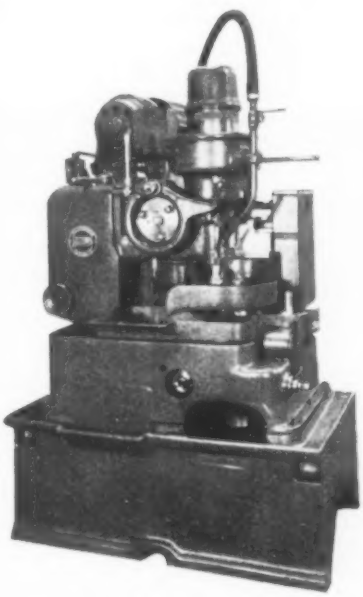
FELLOWS

MACHINES AND TOOLS FOR GEAR PRODUCTI

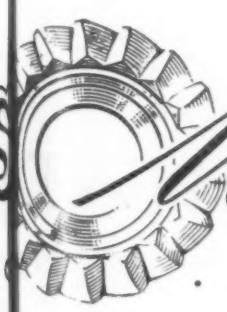
RANSMISSION AS Tough

AS THEIR GEAR SHAPER CUT Gears

"Jeeps" in the heart of Burma, on the burning sands of Libya, or through snow and ice in the Aleutians . . . whatever the task their punishment is gruelling. Yet they unfailingly take our fighting men closer to victory, because they've got what it takes . . . inside. A mechanical fighting heart—a transmission—the gears of which are in most cases cut on Fellows Gear Shapers. In addition to precision, the Gear Shaper possesses the advantage that it will cut internal as well as external spur and helical gears, and many types of gears that cannot be produced by any other method. Unquestionably in days to come, the results of current developments will make still higher precision and production available to all. For an introduction to Gear Shaper possibilities, ask for a copy of our general catalog, "The Fellows Method." Write: The Fellows Gear Shaper Company, Springfield, Vermont—or 616 Fisher Bldg., Detroit, Michigan, or 640 West Town Office Bldg., Chicago.



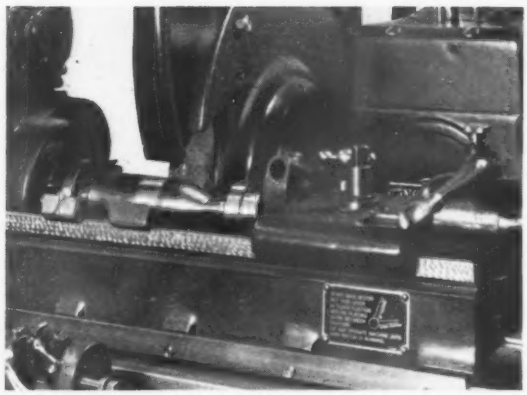
7A-Type Fellows Gear Shaper

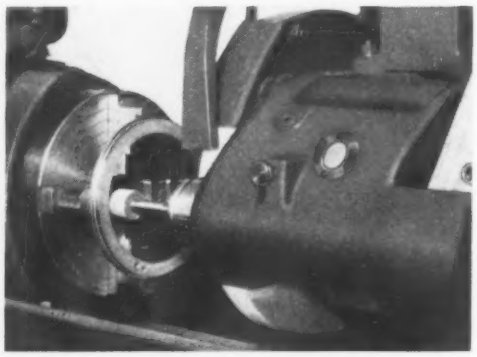


Method

. . . . FROM BLANK TO FINISHED GEAR

All in a day's work
—for CINCINNATI GRINDER ENGINEERS



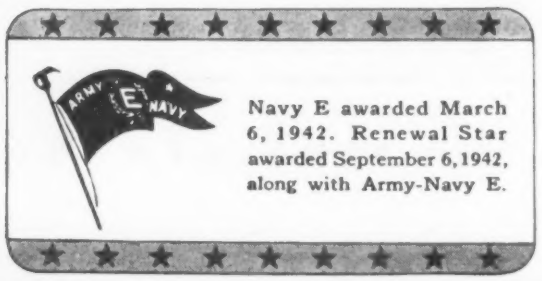


Grinding Internally and Externally on a CINCINNATI Hydraulic Universal, in one chucking of the work to assure absolute concentricity.

Centertype and Centerless precision grinding machines, designed and manufactured by the craftsmen here at Grinding Headquarters, are available in a sufficiently wide range of types and sizes to meet practically every grinding requirement.

Many and complex have been the grinding problems solved by our Field and Factory Engineers. This group is vitally interested in your grinding problems and is ready at any time to offer suggestions and recommendations to help you get more out of your CINCINNATI Grinding Machines. You are invited to use the combined knowledge and experience of this staff of highly trained experts.

CINCINNATI Hydraulic Universal Grinding Machines in 12-inch, 14-inch, 16-inch, 18-inch swings.



Navy E awarded March 6, 1942. Renewal Star awarded September 6, 1942, along with Army-Navy E.

CINCINNATI

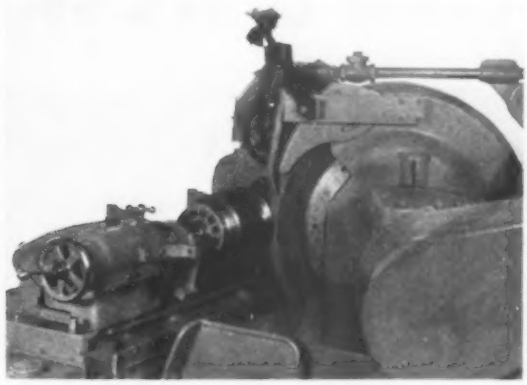
CENTER TYPE GRINDING MACHINES

n: Grinding bourrelet diameter of 75 mm. shell on a NCINNATI 6" Plain Hydraulic equipped with hydraulic footstock and work holding cradles.

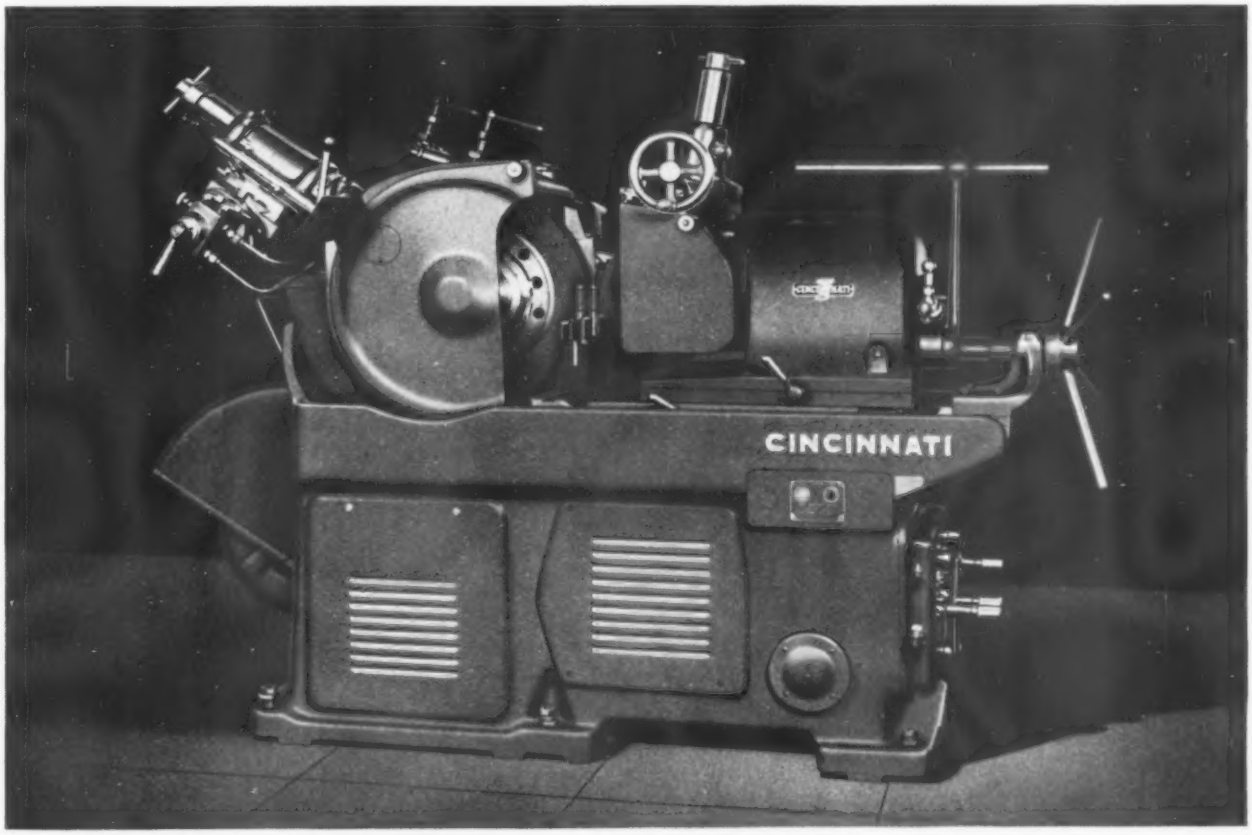
CINCINNATI

CINCINNATI No. 2 Centerless Grinder equipped with special wide range work rest and special pusher type loading fixture for grinding the outside diameter of thrust bearing rings for propeller hubs.

Catalogs G-486 and G-474 cover details and benefits of CINCINNATI Hydraulic Universal Grinding Machines, while catalog G-456 gives complete information on CINCINNATI No. 2 Centerless Grinders. These books are official communiques from Grinding Headquarters. They are yours for the asking.



Cylinder barrel. Grinding skirt diameter and flange on a CINCINNATI 10" Plain Hydraulic equipped with hand Servo infeed attachment.



CINCINNATI No. 2 Centerless Grinding Machine.

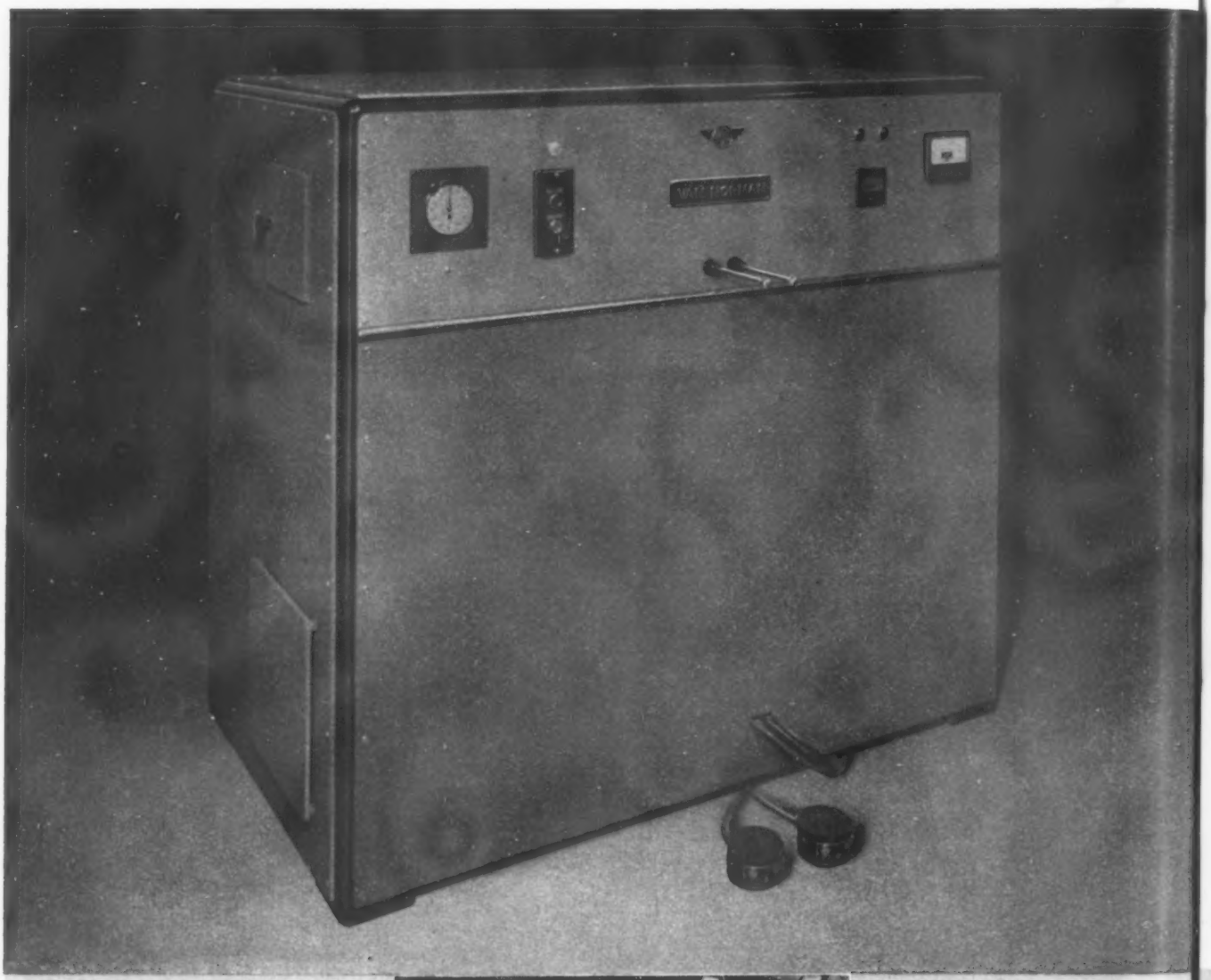
AT GRINDERS INCORPORATED

CINCINNATI, OHIO, U. S. A.

CHINE CENTERLESS GRINDING MACHINES • CENTERLESS LAPPING MACHINES

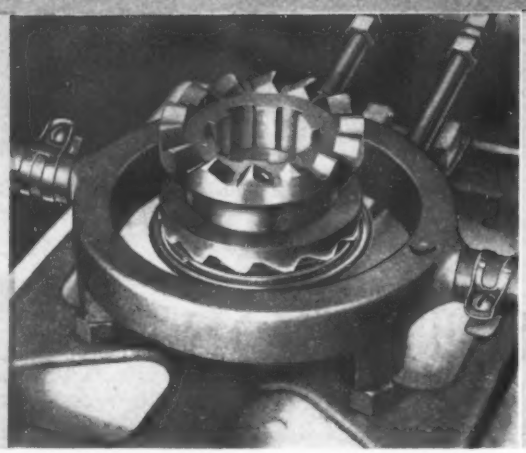
ANNOU

THE NEW VAN NORMAN



HARDENING

For surface hardening flat surfaces, a flat type of heating coil is used. Heating pattern as revealed by tooth surfaces closely follows contour of teeth. Teeth of part shown in illustration are surface-hardened in 13 seconds.



BRAZING

High or low temperature brazing is readily performed on Van Norman units. Illustration shows carbide tip brazed to mild steel tool shank. Operation is completed in a few seconds. Bonds are clean, uniform, and tight.

NCING

INDUCTION HEATING UNITS

FOR

- ***Surface Hardening***
- ***Brazing***
- ***Soldering***

AND OTHER HEATING APPLICATIONS

Designed and engineered by specialists in induction heating, the new Van Norman high frequency Induction Heating Units . . . 16 KW and 32 KW . . . meet the average requirements for surface hardening, brazing, soldering, and other heating applications in every plant, both large and small.

By localizing heat to a specific portion of the workpiece, Van Norman Induction Heating units cut the heating time to seconds. In addition, they minimize distortion and warping often encountered by other methods of heating and leave the work practically free from scale. The heating time and quenching are controlled accurately and automatically to a fraction of a second and part after part can be processed with identical characteristics.

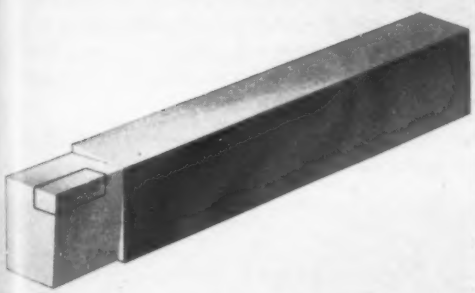
Write, on company letterhead, for your copy of the new Van Norman Induction Heating bulletin. It gives a complete story on induction heating, its scope, uses, possibilities, and principles of operation.

Van Norman Machine Tool Company

Springfield *Massachusetts*

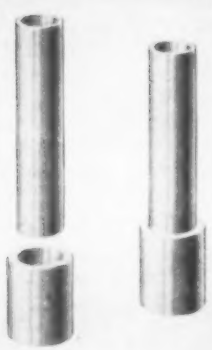
IT PAYS TO "VAN NORMANIZE"

- ***Easy to Operate***
- ***Positive Results***
- ***Uniform Hardening***
- ***Saves Time***
- ***Increases Output***
- ***Reduces Costs***
- ***Conserves Alloy Steels***
- ***Reduces Spoilage***
- ***Minimizes chance of Human Error***
- ***Automatic Operation***
- ***Unlimited Applications***



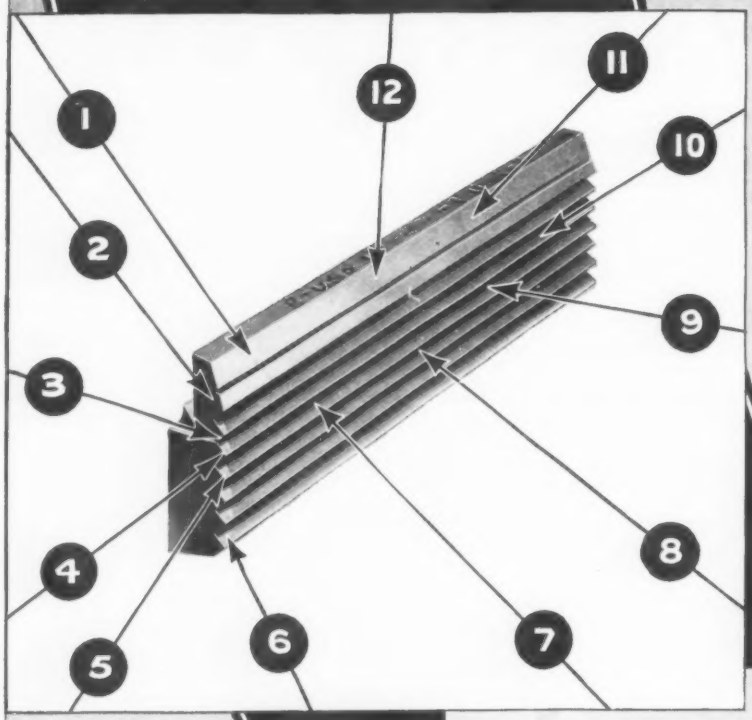
SOLDERING

A typical soldering application performed with induction heating. Irregular as well as regular parts are quickly and easily soldered. The finished unit has little or no discoloration or scale, thus minimizing cleaning work.



Acclaimed..

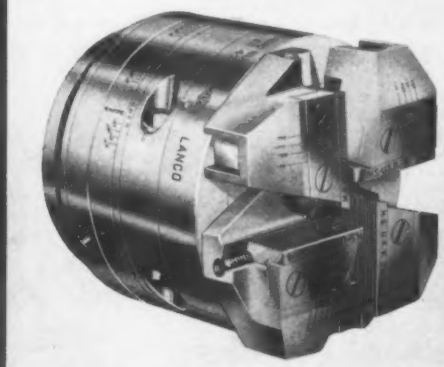
The Finest Thread Cutting Tool in Industry



The LANDIS CHASER

Used Exclusively in LANDIS Die Heads and Threading Machines

LANDIS



1–Permanent throat permits close to shoulder threading throughout life of chasers

2–Rake angle range covers all machinable materials

3–Free cutting condition permits maximum cutting speeds

4–Simple grinding operation renews entire cutting edge and leading feature

5–Line contact with work lessens friction and minimizes thread distortion

6–Leading feature insures thread of accurate lead

7–Lateral absorption of cutting strain reduces vibration and chaser breakage

8–Right and lefthand threading feature reduces chaser equipment

9–Standard chasers thread all diameters with proper chaser holders

10–Interchangeability of chasers lowers operating cost

11–Chaser length provides exceptionally long life and low tool cost

12–Permanent throat gives equal distribution of cut

The life of the Landis Chaser, due to its design which makes it possible to machine the thread form along the entire length of the chaser, is from ten to twenty times that of the hobbed type die.

The cutting edge is renewed completely at each regrinding thereby maintaining the original accuracy of the chaser. The throat is not altered by regrinding and therefore permits close-to-shoulder threading throughout the life of the chaser.

Landis Chasers are interchangeable—any one of a set may be replaced.

LANDIS MACHINE CO. Waynesboro, Pa.

LANDIS REG. U.S. TRADE—MARK PAT. OFF.

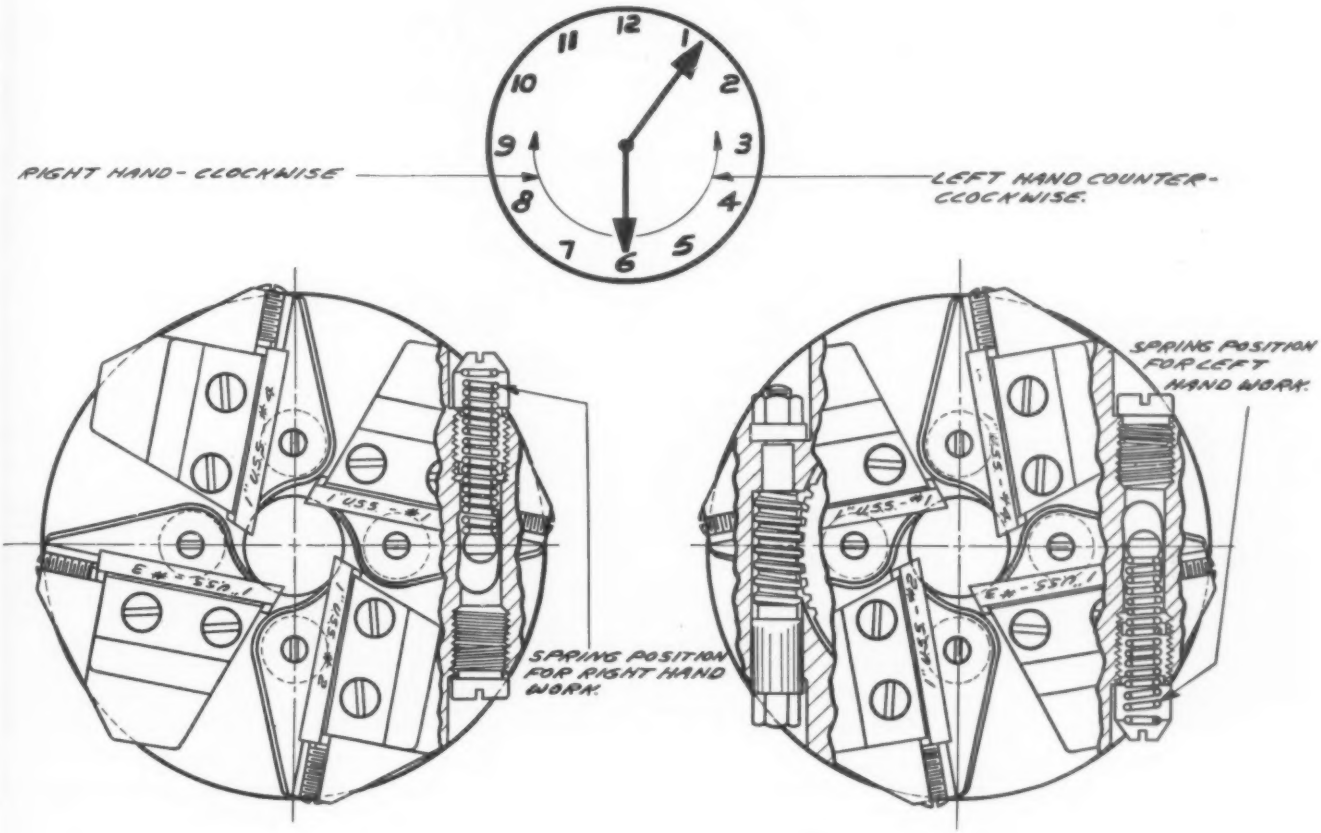
THREAD TIPS

A Good Mechanic Knows and Cares For His Machine

In the Interest of Efficiency, Better Workmanship and Higher Production

WHEN CHANGING FROM RIGHT HAND TO LEFT HAND THREADING

CHECK { First: Opening Action of the Head
Second: Sequence of the Chasers


RIGHT HAND - CLOCKWISE
LEFT HAND COUNTER-CLOCKWISE
SPRING POSITION FOR RIGHT HAND WORK
SPRING POSITION FOR LEFT HAND WORK

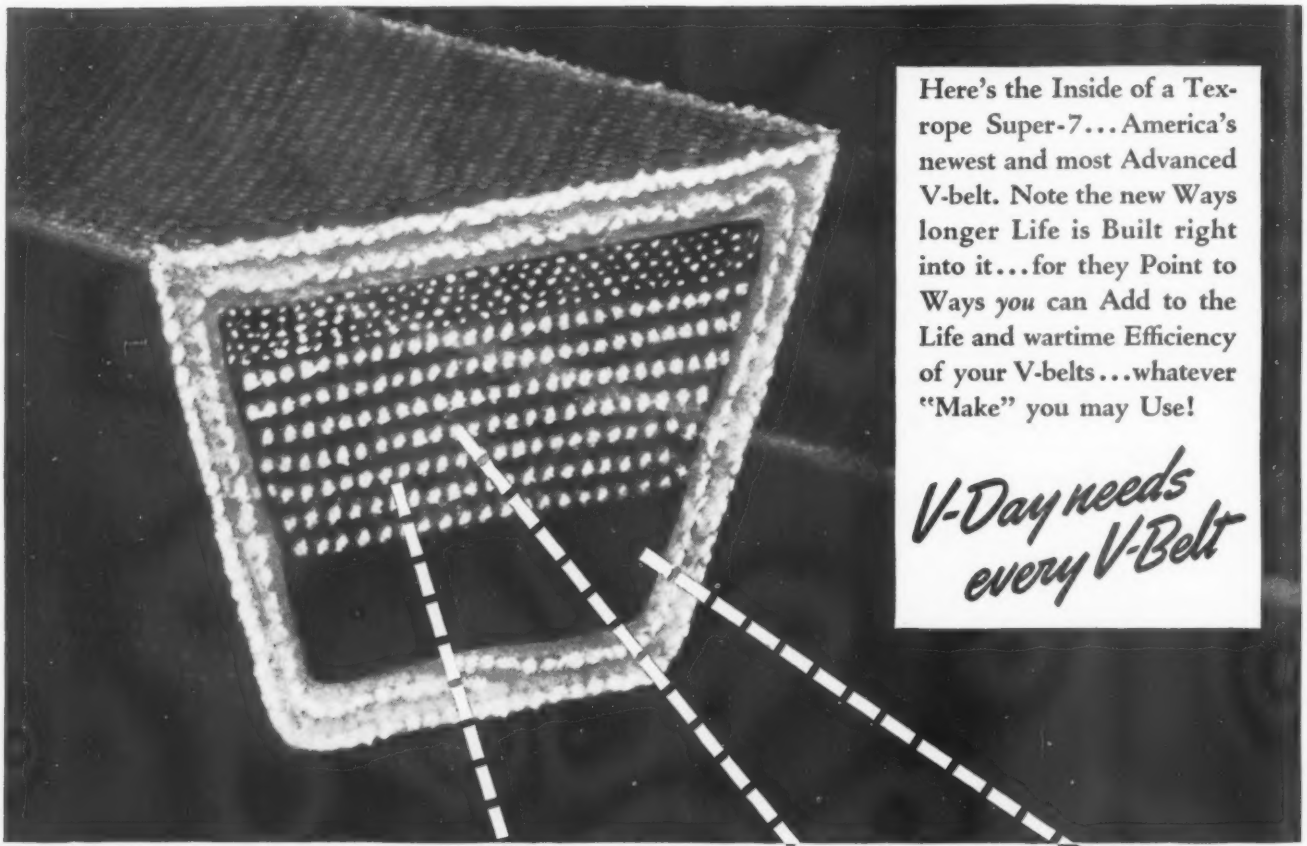
The opening action of LANDIS Heat Treated Die Heads is controlled by a coil spring located in the size adjusting ring. LANCO and LANDMATIC Heat Treated Die Heads are easily converted for Right Hand or Left Hand Threading by substitution of the correct chaser holders and by reversing the action of the spring as illustrated by the above diagrammatic sketch.

LANDIS Chasers can be used for either right hand or left hand threading by merely sharpening both ends. Set chasers in rotation clockwise for right hand threading and counter clockwise for left hand threading.

Be Threadwise—Employ LANDIS Long Life Tangential Chasers

LANDIS MACHINE COMPANY
Waynesboro, Penna., U. S. A.

X-Ray of IDEAS FOR Longer Wear



Here's the Inside of a Texrope Super-7... America's newest and most Advanced V-belt. Note the new Ways longer Life is Built right into it... for they Point to Ways *you* can Add to the Life and wartime Efficiency of your V-belts... whatever "Make" you may Use!

V-Day needs every V-Belt

Plain Facts on Wartime Care of Rubber V-Belts

FREE! Every engineer should have it in his technical library!

It's packed with vital facts on care of *all* makes of V-belts — contains no advertising. Send in for it *today!*

50% STRONGER CORDS produced by the new Flexon process combat stretching. **You** can fight stretching—and the slip and heating that result—by promptly taking up any slack in your drives. Remember, V-belts working round the clock need inspection *4 times as often* as in peacetime!

20% MORE CORDS than before help protect the new Texrope Super-7 against strains and breaks. **You** can minimize breaks in your plant—whatever "make" of V-belts you use—by requiring that V-belts *never* be pried into grooves. Good rule for cutting down internal injuries!

NEW COOLER-RUNNING CUSHION of special rubber "eases" Texrope Super-7 cords around sheaves — for smoother flexing and less heat. **You** can fight heat by preventing misalignment. It causes rubbing of belt sides. So keep sheave grooves in line — shafts parallel.

☛ *When you do Need new V-belts, invest in the Best . . . Texrope Super-7!*

A 1544-A

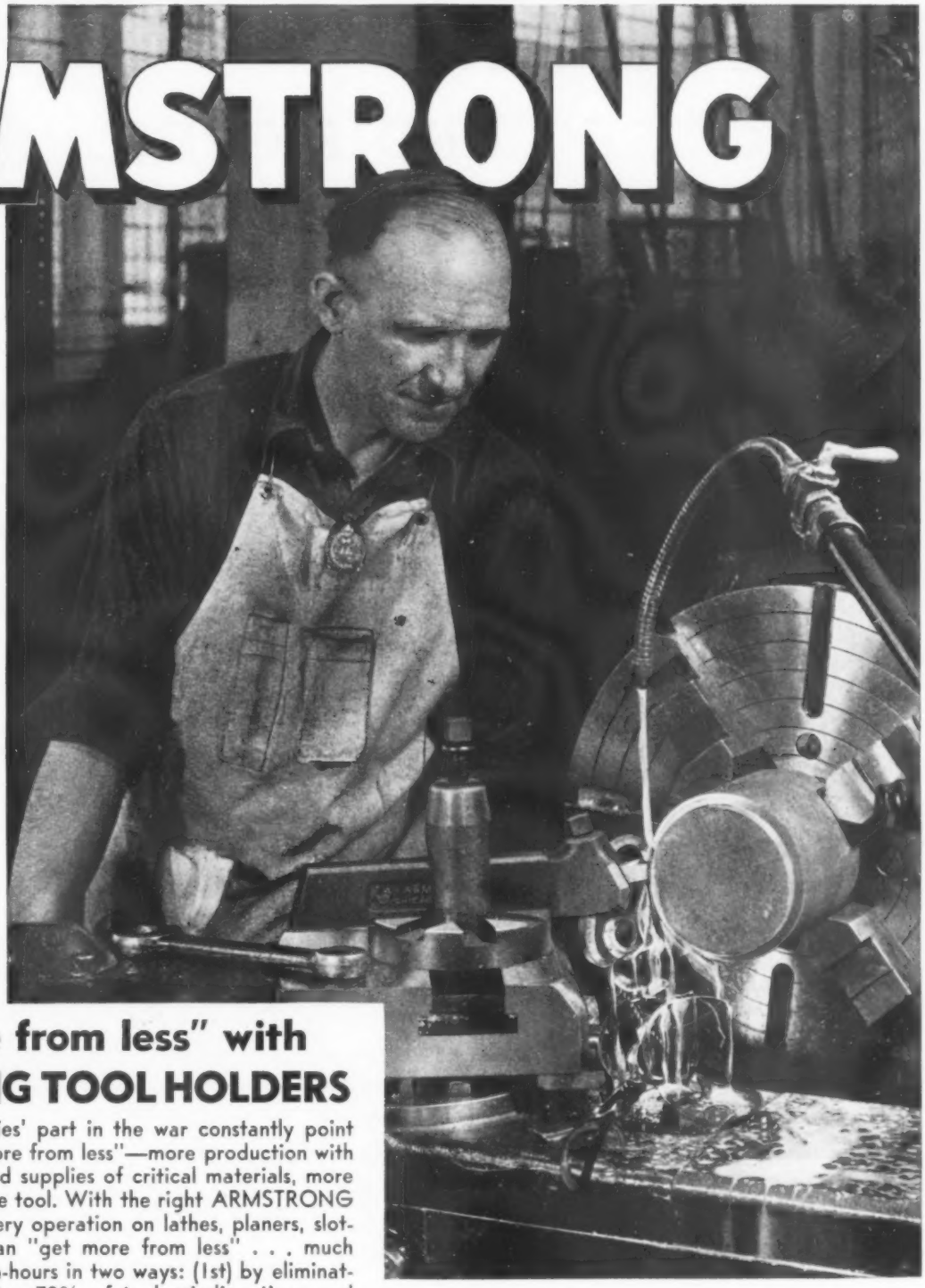
ALLIS-CHALMERS

WE WORK FOR VICTORY — WE PLAN FOR PEACE

TEXROPE* SUPER-7 V-BELTS

*Trade mark registered U. S. Patent Office. Texrope Super-7 V-Belts are the result of the cooperative research and design genius of two great companies — Allis-Chalmers and B. F. Goodrich — and are sold exclusively by Allis-Chalmers. Available in all sizes.....½ h.p. to 2,000 h.p.

ARMSTRONG



Get "more from less" with ARMSTRONG TOOL HOLDERS

Those heading industries' part in the war constantly point out that "we must get more from less"—more production with fewer men, with restricted supplies of critical materials, more ouput from every machine tool. With the right ARMSTRONG TOOL HOLDERS for every operation on lathes, planers, slotters and shapers, you can "get more from less" . . . much more. You can save man-hours in two ways: (1st) by eliminating all tool forging, saving 70% of tool grinding time, and (2nd) by eliminating tooling-up delays. Tooling up is reduced to the selection of a cutter and adjusting its clearance. You save 9/10 of your critical high speed steel too, for an ounce of high speed steel in a tool holder will do work requiring 10 ounces in a forged tool. You can step up output on every machine tool too, because ARMSTRONG TOOL HOLDERS operate efficiently at speeds and feeds far above the "standard" speeds and feeds generally used.

Use ARMSTRONG TOOL HOLDERS for every operation —increase speeds and feeds, often it is possible to actually double output. Get more production with less waste.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

315 N. FRANCISCO AVE. CHICAGO, U.S.A.

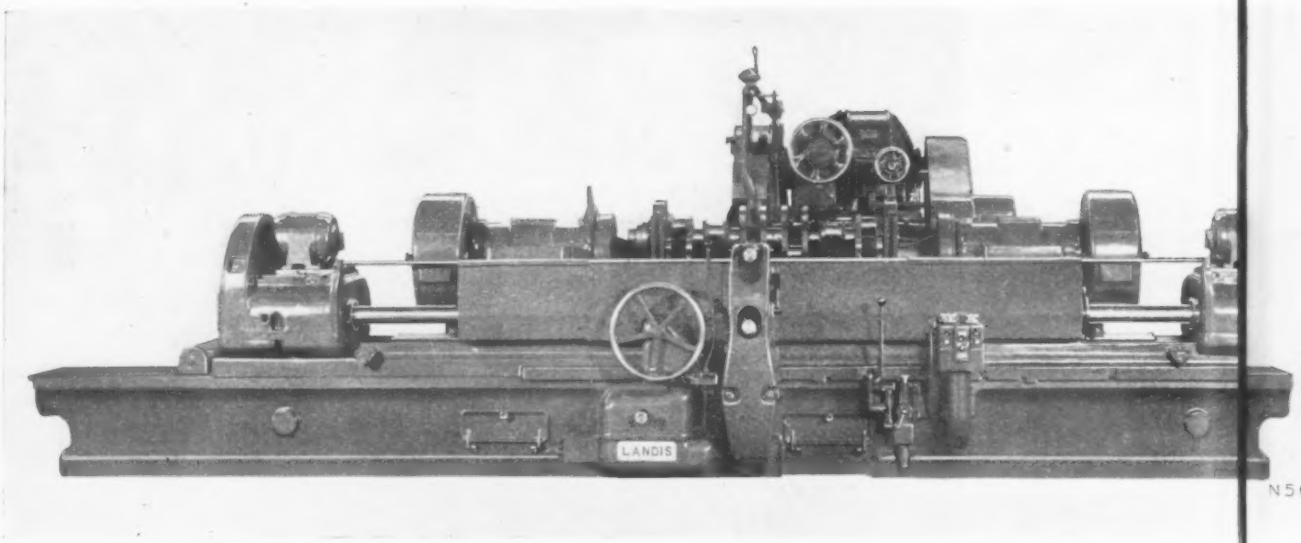
Eastern Warehouse and Sales:
199 Lafayette St., New York

Buy ARMSTRONG Tools from your Supply House

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

To Finish The Job Quicker . . .

CHOOSE LANDIS GRINDERS FOR THE LONG CRANKSHAFTS and CAMSHAFTS



The volume of production required these days makes it impractical to depend upon makeshift arrangements or antiquated equipment to take care of the demands.

Manufacturers of longer than average crankshafts and camshafts have found this problem acute because normally the limited demand did not justify the purchase of modern, highly specialized equipment. Now it is badly needed and Landis is supplying it.

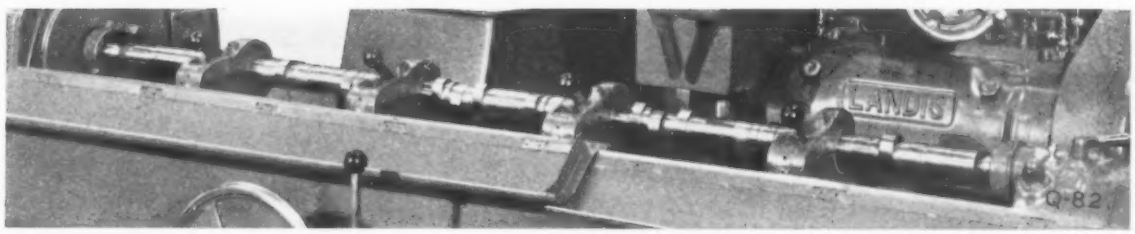
One of these machines shown immediately above is a 25" x 96" Type DD Hydraulic Crank Pin Grinder with individual motor drive to each work head. A like machine is available in 120" length for still longer shafts.

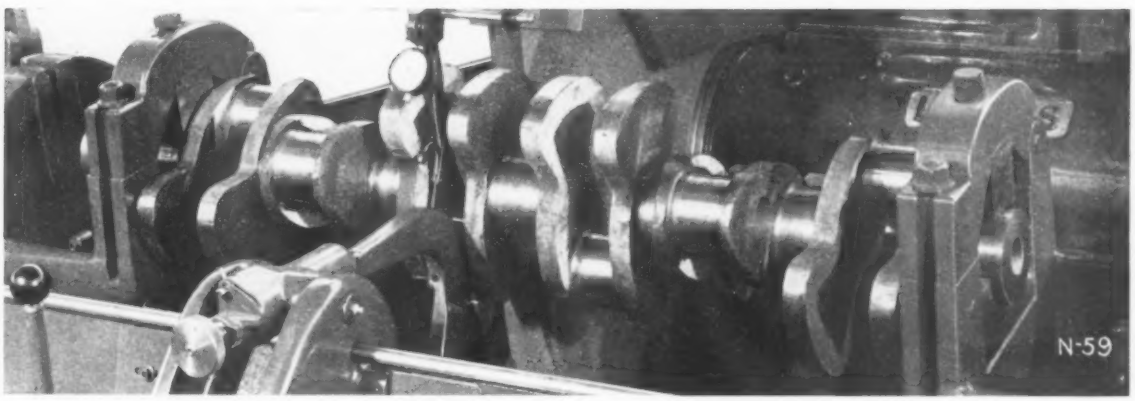
Output is high because the many principles of production crankshaft grinding employed so successfully by the automotive industry in past years have been applied to this machine. Take the stationary bed mounted work rest and the hydraulic straight infeed as examples.

Accuracy of output is considerably improved by the work drive arrangement already referred to. Where long shafts are involved, it is essential that the drive be of such a nature that no strains are set up within the work. This is effectively accomplished on the Landis by the use of the carefully synchronized dual motor drive.

PRECISION LANDIS GRINDERS

Unusual Performance As Usual

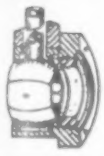




Above to the right is a 10"x120" Type D Hydraulic Cam Contour Grinder Like the Type DD Crank Grinder, it employs many high production features which have in recent years been utilized by the automotive industry. As a consequence, the Diesel engine camshafts which it is producing are being turned out with all the speed that could be desired.

Those who are faced with the necessity of manufacturing long crankshafts and camshafts can look to Landis for engineering assistance and equipment, knowing that years of experience will back up every recommendation and every machine.

LANDIS TOOL CO. WAYNESBORO, PENNSYLVANIA



MICROSPHERE WHEEL SPINDLE BEARINGS.

STATIONARY BED MOUNTED WORK REST.

HYDRAULIC STRAIGHT INFEED.

401

IF YOU ARE RUNNING A WAR FACTORY

please accept this personal invitation

IF you are engaged in any kind of war production you are invited to make use of a free service which has already stepped up production in hundreds of factories—large and small.

Here is how it works. You simply telephone your nearest G-E lamp office, or your Electric Service Company, Electrical Jobber or Contractor. Say: "We want to do all we can to speed production. Will you have a lighting man call and see if he can help us?" The lighting man will carefully inspect your lighting, look for bottle-necks caused by glare or gloom or shadows. He'll show you how to correct those troubles—with the least possible use of critical materials.

You can't *lose* by accepting this invitation. And you may *gain* both in production and in employee morale. So won't you phone today?

TYPICAL LIGHTING TROUBLES WHICH HOLD BACK PRODUCTION

1. GLARE—from bare bulbs or wrongly placed fixtures. You may not realize how this is holding back your production.

2. SHADOWS—sometimes a worker's own shadow slows up his work. Moving a light fixture often removes this hazard.

3. GLOOM—dirt and grease on bulbs and reflectors can cut out *half* your light—and slow down production accordingly. Soap and water work wonders.

For wartime lighting help . . . Phone one of these G-E lamp numbers or your Electric Service Company or G-E lamp supplier

ATLANTA . . . . . **WAlnut 9767**
Red Rock Bldg.

BOSTON . . . . . **HAncock 1680**
United Shoe Machinery Bldg.

BUFFALO . . . . . **LAfayette 7194**
Genesee Bldg.

CHICAGO . . . . . **HArrison 5430**
842 S. Canal St.

CLEVELAND . . . . . **CHerry 1010**
Williamson Bldg.

DALLAS . . . . . **LD 224**
General Electric Bldg.

DENVER . . . . . **MAin 6141**
Merchandise Mart

DETROIT . . . . . **CHerry 6910**
Book Tower

KANSAS CITY . . . . . **VIctor 7671**
2100 Wyandotte St.

LOS ANGELES . . . **MIchigan 8851**
Edison Bldg.

MINNEAPOLIS . **GRanville 7286**
Northwestern Terminal

NEW YORK . . **Wickersham 2-6300**
570 Lexington Ave.

OAKLAND . . . . . **HIgate 7340**
1614 Campbell St.

PHILADELPHIA . . . **KINgsley 3336**
Mitten Bldg.

PITTSBURGH . . . . . **FAirfax 7911**
601 E. General Robinson St.

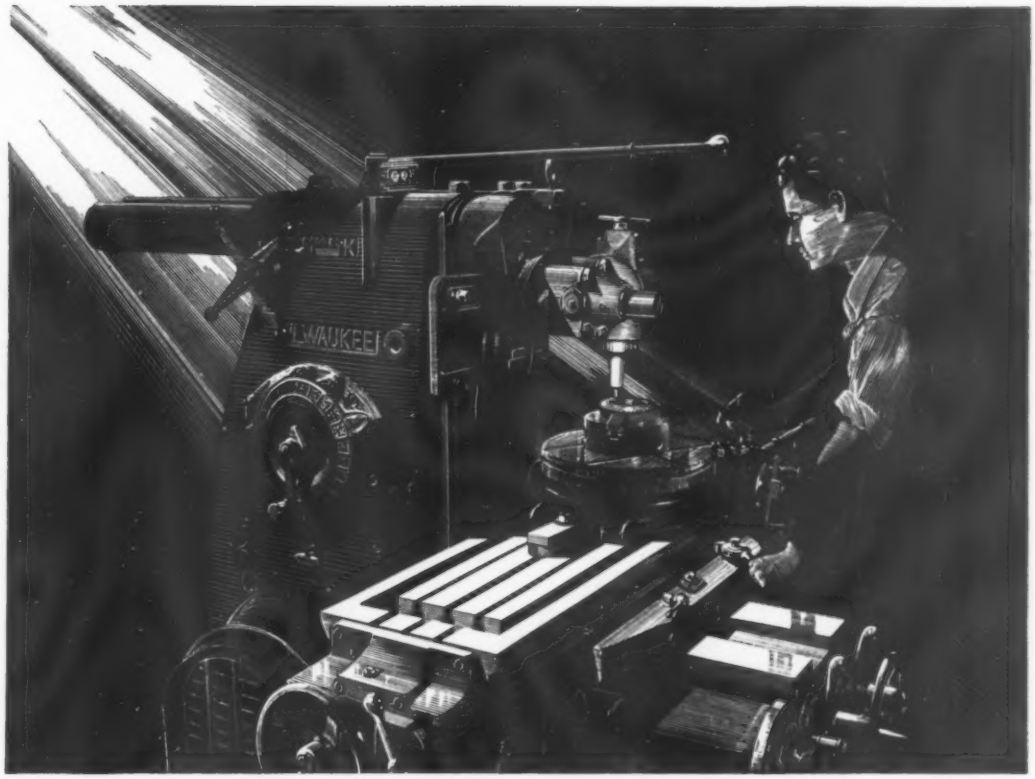
PORTLAND . . . . . **BEacon 2101**
Oregon Transfer Bldg.

ST. LOUIS . . . . . **CHestnut 8920**
710 N. 12th Blvd.

See your phone book for G-E Lamp offices in other principal cities

G-E MAZDA LAMPS

GENERAL ELECTRIC



• • • CONVERSION IS JUST A "QUICKIE" WITH THIS ATTACHMENT

Here's a sixty-four dollar question for production men — what attachment quickly converts plain or universal horizontal Milwaukee Milling Machines enabling them to do more than five out-of-the-ordinary milling operations?

It's the Milwaukee Standard High-Speed Adjustable Universal Milling Attachment and here are the jobs it will handle:

— end mill a scroll (as shown above and using a low lead attachment and rotary table).

— for intricate milling on dies, templates, patterns.

— for milling dovetails, T-slots, other hard-to-get-at operations.

— for circular milling of various kinds, working with a rotary table.

— for spiral milling at high speed, working with a dividing head and lead attachment.

Buy Victory with at least 10% in War Bonds!

'43 FOR VICTORY

When You Can't Get A New Machine . . . conversion of existing equipment to special milling operations is often the answer. The Emergency Production Service Department of Kearney & Trecker is organized to aid you on quick conversion or tougher milling problems. Write or wire — you'll get action pronto.

KEARNEY & TRECKER CORPORATION
MILWAUKEE, WISCONSIN

Milwaukee MACHINE TOOLS

GRINDERGRAMS

TRUING a grinding wheel is primarily intended to make the wheel face run absolutely concentric with its axis.

DRESSING a grinding wheel conditions its cutting face. Dressing influences the type of surface finish obtained although the face may not, however, run true.

WE ALSO SERVE

AMERICAN arms convincingly demonstrate their superiority on every fighting front. And on every fighting front—in every combat craft on land, on the sea and in the air—in all the multitude of weapons and material for modern warfare, the craftsmanship of Norton Company is represented. Pioneer in the art of precision grinding, our machines produce components for all types of weapons and transport. Not a vessel plows the sea nor a military vehicle follows the desert highway or plunges into the tangled jungle, not a plane takes to the air, but it carries parts, one or many, finished by Norton machines. Grinding machines provide that essential—dimensional accuracy—which is so vital to modern weapons. Surfaces produced on Norton Grinders are found widespread in automatic rifles and pistols, machine guns, quick firing 75 mm. cannon and ponderous, earth shaking 188 mm. howitzers. Surely we also serve, not only on the home production front but actually in the earth-encircling battle smoke of this global war.

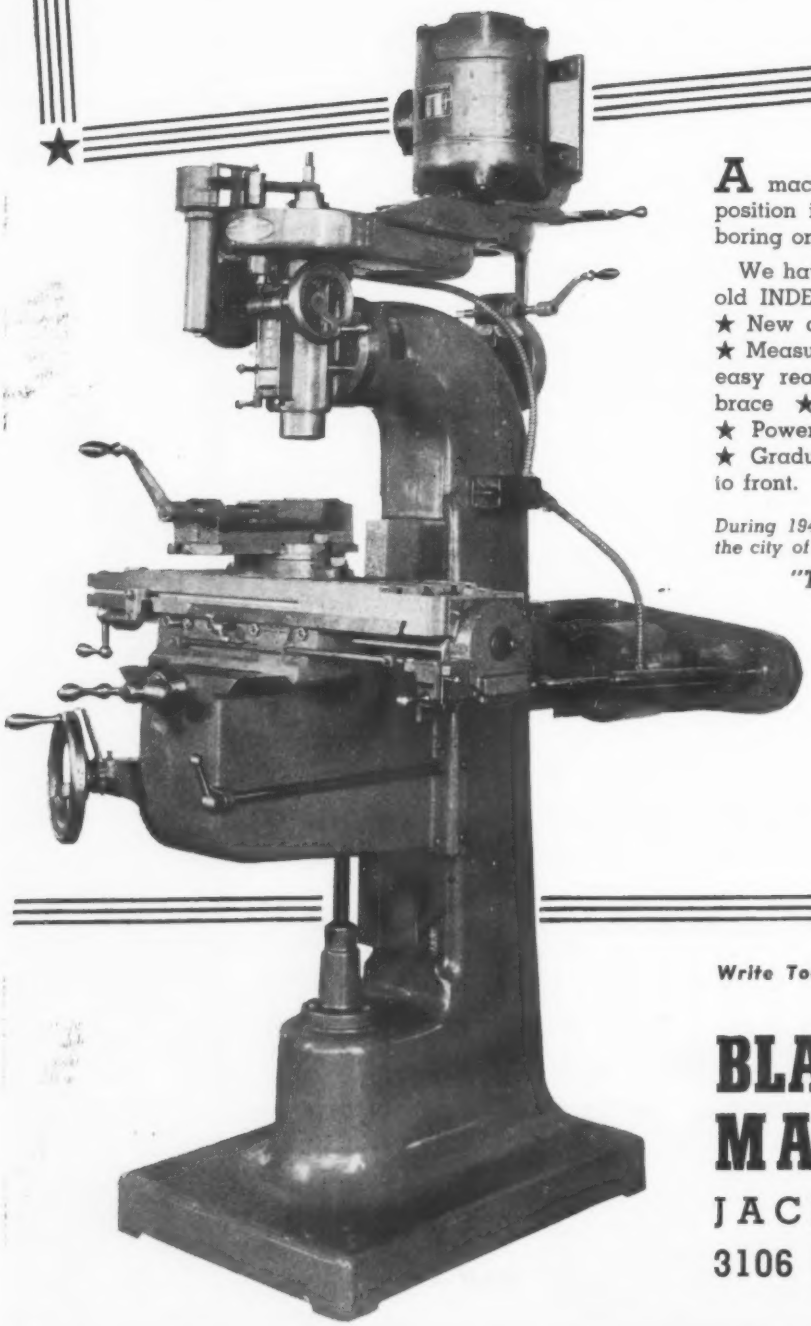
NORTON COMPANY, WORCESTER, MASS.

New York • Chicago • Detroit • Cleveland • Hartford

M-452

NORTON MACHINES

The New INDEX MILLS for 1943



A machine which has already taken a prominent position in the Victory program milling, drilling and boring on tool, die, experimental and production work.

We have incorporated all of the fine features of the old INDEX . . . PLUS these NEW ADDED FEATURES— ★ New and heavier column, knee, saddle and table ★ Measured height ★ Verniers mounted on angle for easy reading ★ ½ H.P. motor ★ Motor supporting brace ★ Three clamping bolts head to column ★ Power feed to spindle ★ Permanent table stop ★ Graduated hand wheel ★ Knee clamp extended to front.

During 1942, there were well over 200 INDEX MILLS sold in the city of Detroit alone . . . The majority being repeat orders,

"Those that's got 'em. . . . Like 'em."

Manufactured by

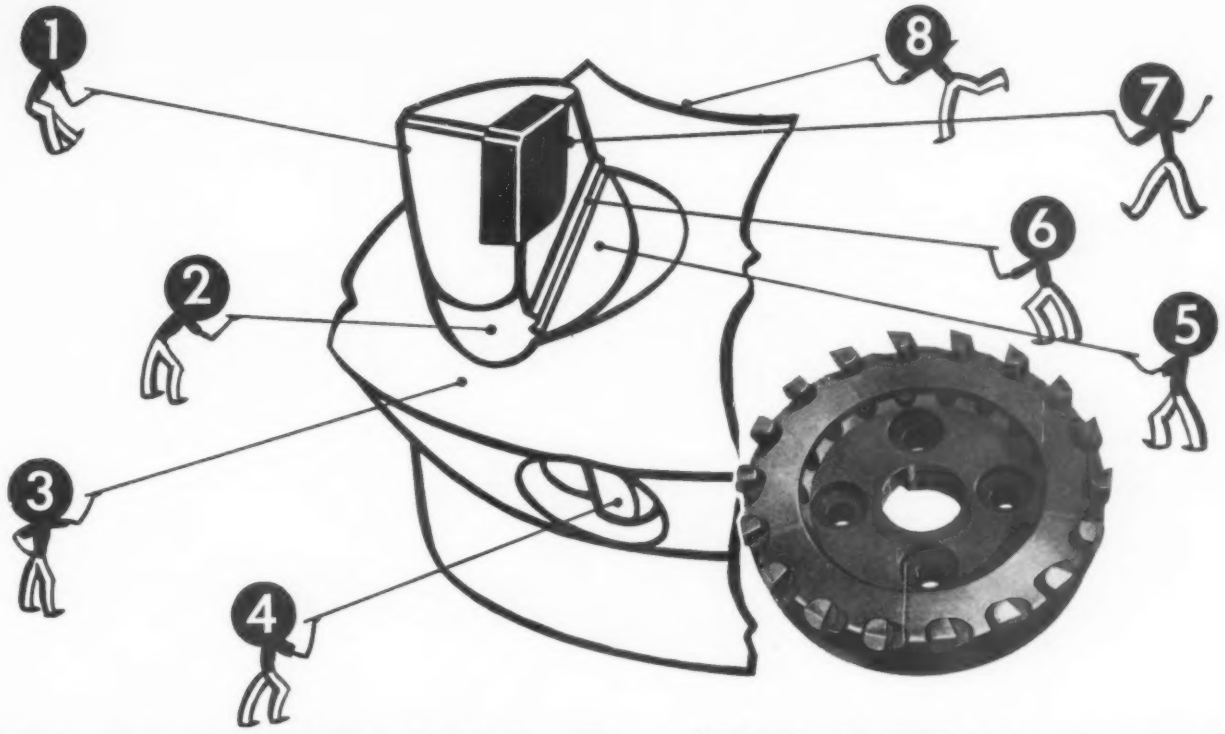
Index Machine & Tool Company

Write Today For Descriptive Folder From Sales and Distribution Agents

BLANK & BUXTON MACHINERY CO.

JACKSON, MICHIGAN

3106 East Michigan Avenue



FEATURING FEATURES

OF LOVEJOY TYPE "A" MILLING CUTTERS

Lovejoy type "A" inserted-tooth Milling Cutters have features that put them in a class with solid mills regarding strength and rigidity—and in a class by themselves regarding convenience, production and economy.

1 Rugged support for cutting edge of blade — whether it is solid High Speed Steel, Stellite, Rexalloy or Tungsten Carbide.

2 Round hole in housing eliminates tendency to fracture under coarse feeds at high speeds.

3 Tough forged steel housing.

4 Positive locking device for blade makes it easy to compensate for wear and grinding.

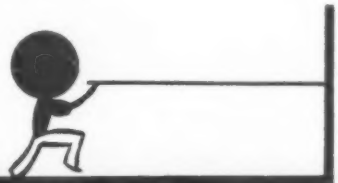
5 Finely serrated blade and shoe guarantee minimum metal removed from blade when resharpening.

6 Serrations are on the front of the blade—not on the back, or locating side.

7 Lovejoy blades are interchangeable over a wide range of sizes. High Speed Steel, Cemented-Carbide, Stellite, and Rexalloy blades are carried in stock for immediate shipment.

8 Bores are precision ground concentric with the face of the cutter.

There is a complete line of Lovejoy positive-locking Milling Cutters to meet every requirement—details and specifications will be found in the Lovejoy Catalog. Send the coupon today!



LOVEJOY TOOL COMPANY, INC.
SPRINGFIELD, VERMONT, U. S. A.

Please mail me the 24-page Lovejoy catalog covering the full line of Lovejoy Mills.

NAME.....TITLE.....

COMPANY .....

STREET .....

CITY.....STATE .....

A.M.

We do not make Electronic Tubes

but—

WE ARE HELPING TO MAKE THEM BY NOT USING TANTALUM

TANTALUM is an essential element in the electronic tubes used in planes, tanks, ships, "subs," listening devices, "walkie-talkies," and wherever radio or sound equipment or "electric eyes" are used. We are urged to save Tantalum as a scarce, allocated metal on the "most critical" list.

FIRTHITE RESEARCH has enabled us to produce a steel-cutting sintered carbide of superior quality in which Tantalum is **unnecessary.** FIRTHITE Engineers are prepared to demonstrate the Tungsten-Titanium type which:

(1) Is made from domestic alloys;

(2) Is cheaper than the Tantalum types;

(3) Steps up production of steel products;

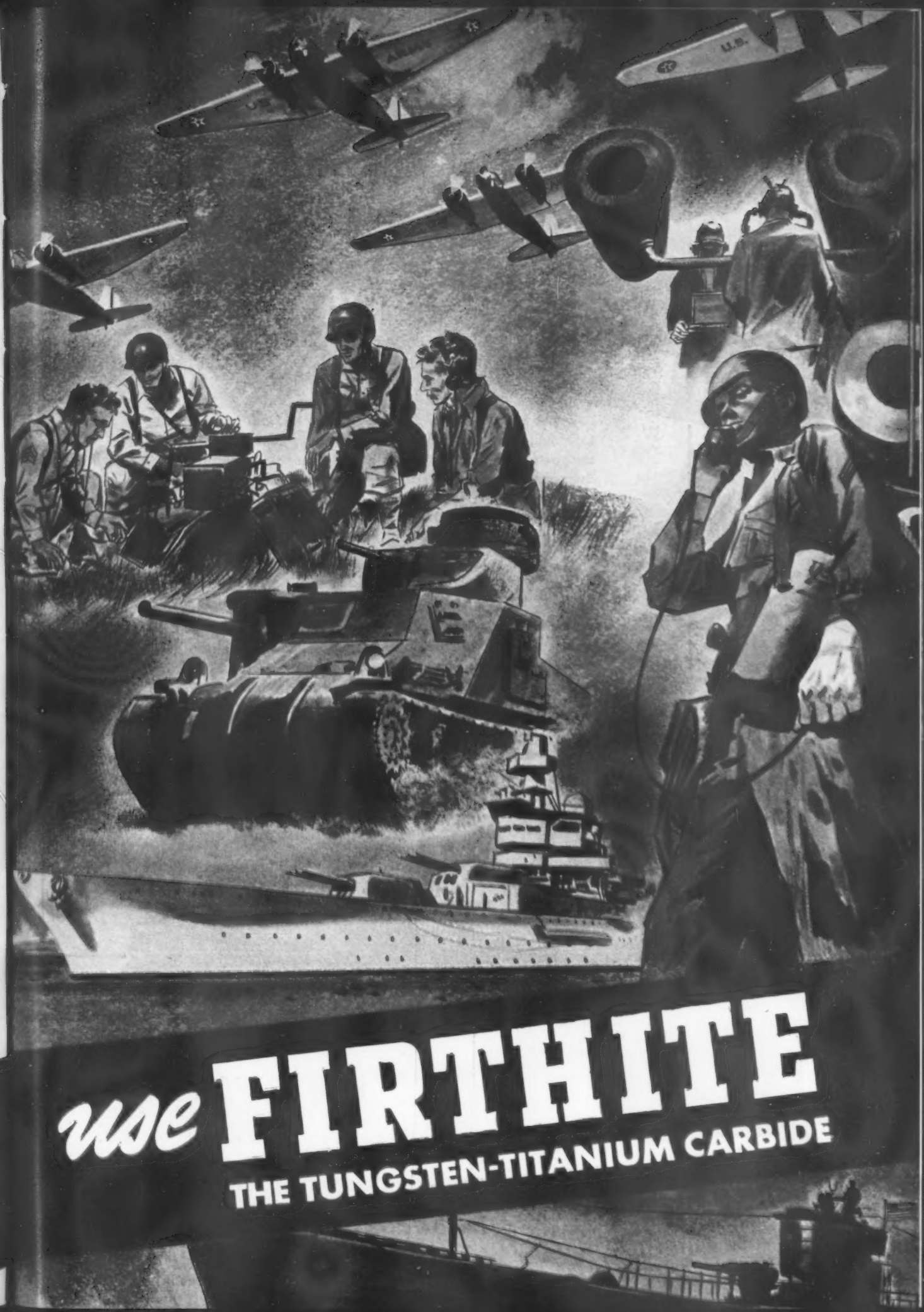
(4) Releases Tantalum for more essential uses.

May we prove the value of the Tungsten-Titanium type to you?

Firth-Sterling

STEEL COMPANY

OFFICES: McKEESPORT, PA. NEW YORK - HARTFORD - PHILADELPHIA
CLEVELAND - DAYTON - DETROIT - CHICAGO - LOS ANGELES


use FIRTHITE
THE TUNGSTEN-TITANIUM CARBIDE

MUNITIONS MANUFACTURERS

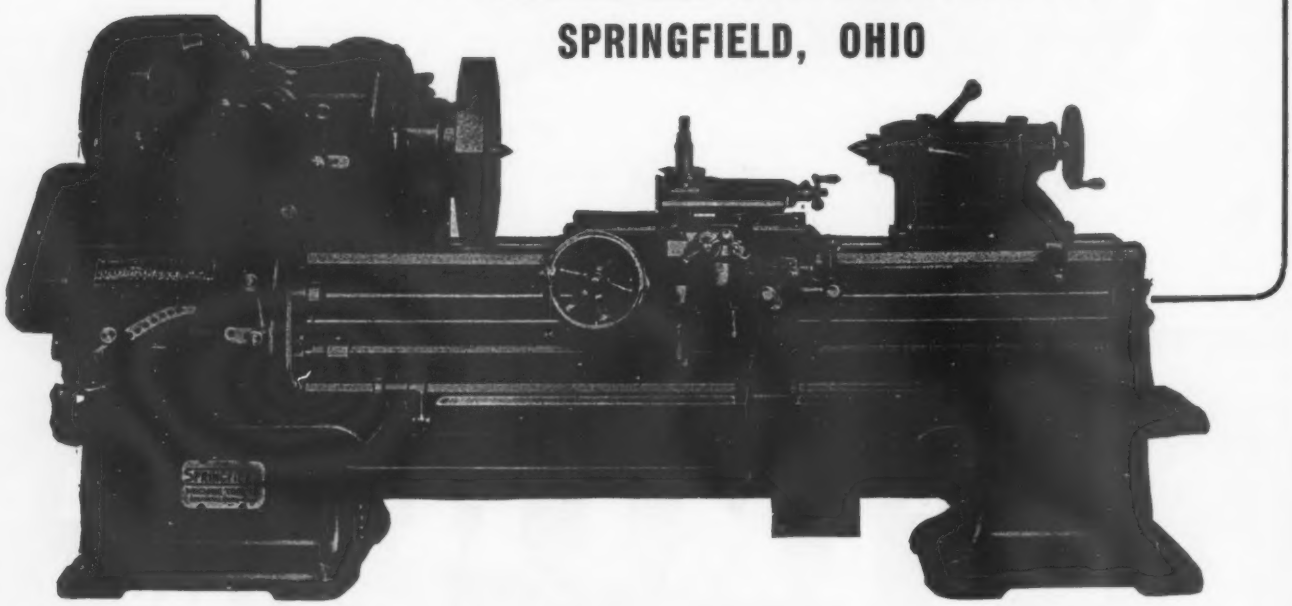
...LOOK TO SPRINGFIELD PRECISION LATHES!

. . . here is a lathe which is truly modern from headstock to tailstock. Features which are especially timely, mark it as an outstanding value for both tool room and quantity production use. Primary among these features—one that assures accuracy, and therefore is of great importance to munitions manufacturers—is MATERIALS.

Springfield Lathe beds are made in our own foundry—of highest nickel-chrome gray iron—an operation that enables us to *guarantee* strength and wear-resisting qualities . . . allows us to follow through on each casting operation . . . makes *certain* every rigid standard we specify. Springfield iron itself, too, is especially resistant to warping and marring, even under severest service. Here, then, are factors that account for the sustaining, over long periods of use, of the original accuracies built into every Springfield Lathe.

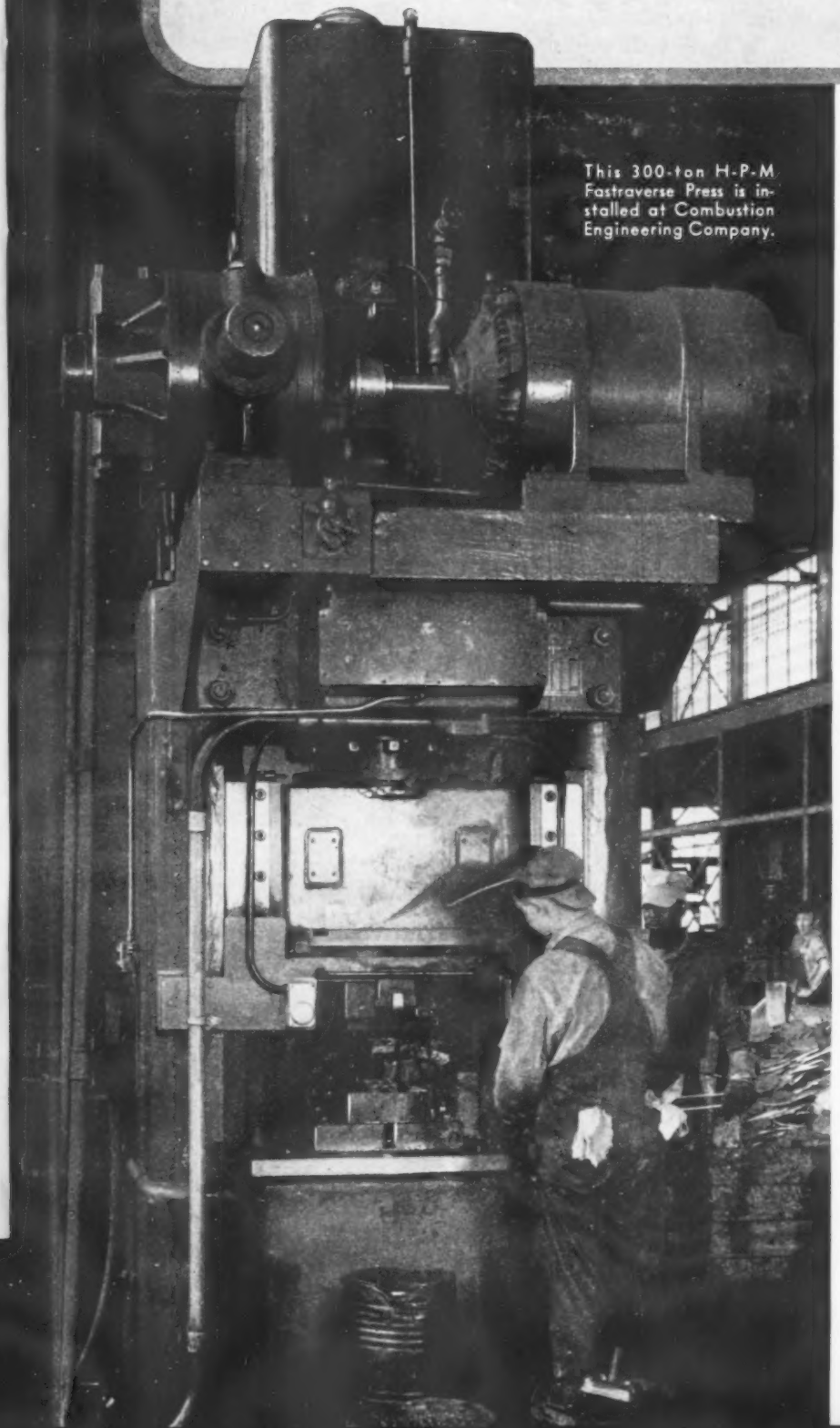
The SPRINGFIELD MACHINE TOOL Co.

SPRINGFIELD, OHIO



Retooling, especially for munitions manufacturers, should take into consideration (1) extreme ACCURACY and (2) maintenance of such accuracy. In other words, LONG LIFE. And the Springfield Lathe delivers both!

BOILER HAND HOLE COVERS FOR *Liberty Ships* ARE FORGED with an H-P-M FASTRAVERSE PRESS



This 300-ton H-P-M Fastraverse Press is installed at Combustion Engineering Company.

Die-forging technique has been revolutionized by the H-P-M FASTRAVERSE FORGING PRESS. Advantages over mechanical forging machinery are numerous:

1. ***Completely self-contained; driven by an H-P-M radial pump mounted overhead.***
2. ***Smooth high speed operation with shockless reversal—no drop hammer action.***
3. ***Economical to install, operate and maintain.***
4. ***No auxiliary equipment required for press operation.***
5. ***Automatic press cycle—push-button operation.***

Send your forging equipment inquiries to H-P-M. Forge the modern way—with H-P-M Fastraverse Presses.

THE HYDRAULIC PRESS MFG. CO.
Mount Gilead, Ohio, U.S.A.

District Sales Offices: New York, Syracuse, Detroit, and Chicago. Representatives in Principal Cities.

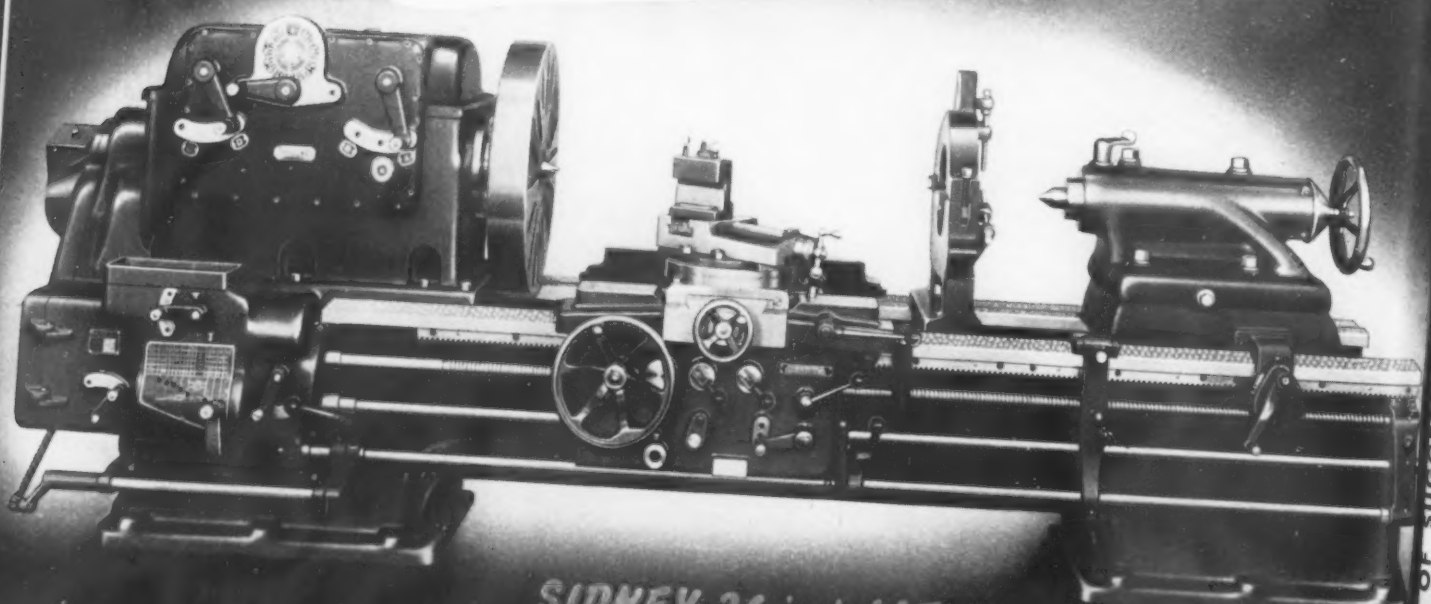
HPM

Sidney Lathes

● The lathes today that will stand the strain of "round-the-clock" production—maintain accuracy—keep needed production flowing to our many fronts are the lathes that will be selected for our future output when costs will take a more prominent place in production plans.

Sidney Lathes operating in airplane plants—Shipyards—munitions plants—tank and industrial plants are meeting the test of urgent war production.

The 36 inch Sidney Lathe shown is designed and built to give the utmost of production—the greatest possible versatility—and long, trouble-free life. Massively built, 16 speed continuous tooth herringbone geared head and versatile gear unit are a few of the many points of Sidney construction that make for greater production—dependable accuracy—and longer, care-free life.



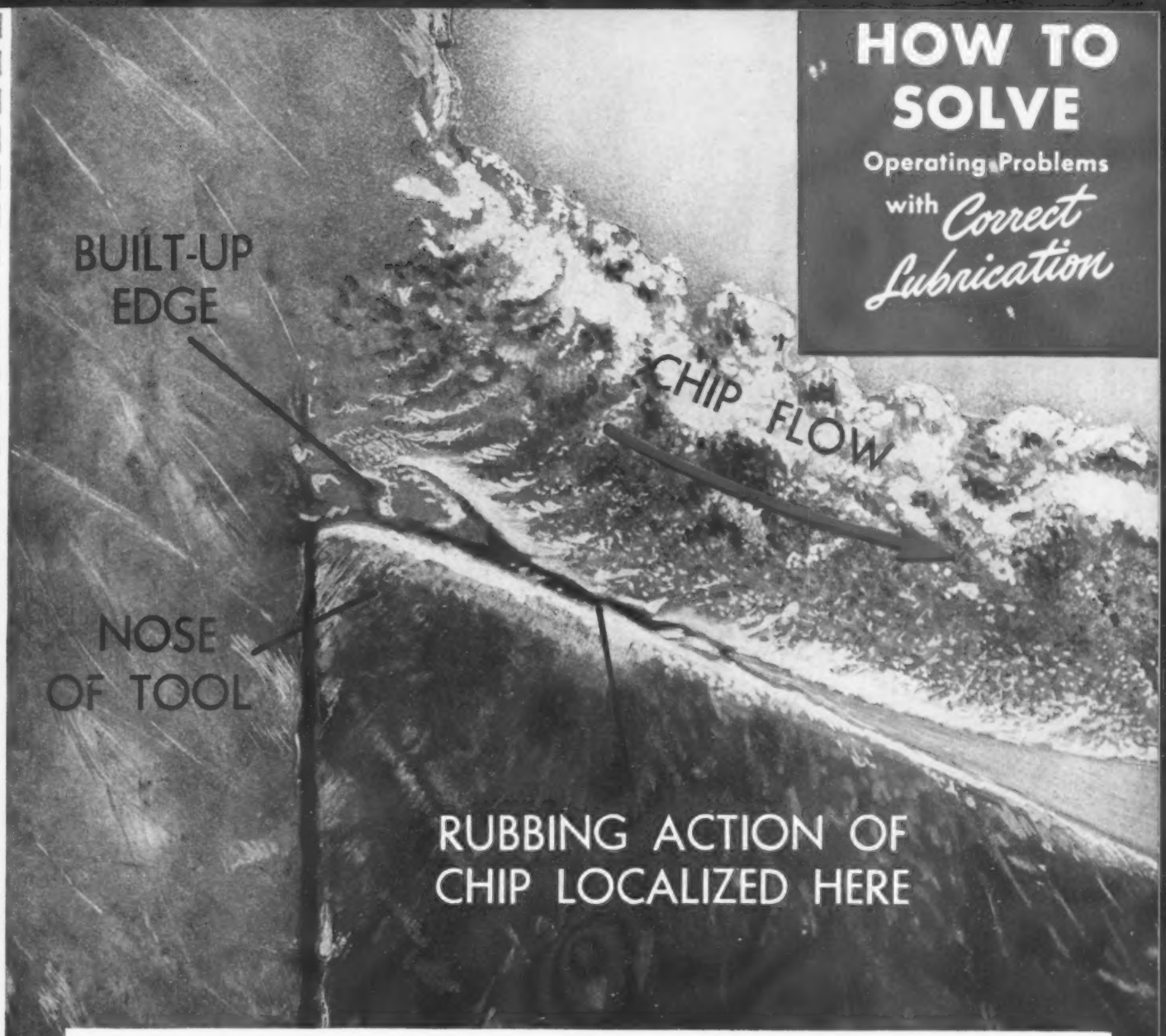
SIDNEY 36 inch LATHE

The SIDNEY MACHINE TOOL Company

Builders of Precision Machinery

SIDNEY ESTABLISHED 1904 OHIO

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION



New Facts on Metal Cutting

THE PICTURE ABOVE is a photographic enlargement of the cross-section of a tool cutting metal. NOTICE THE BUILT-UP EDGE. That small piece of metal alternately builds up and sloughs off. It is the key to tool life and work finish.

The built-up edge, during its existence on the cutting edge, exerts the pressure which does the actual cutting or shearing of the metal.

Sufficient build-up protects the cutting edge by localizing the rubbing action of the chip some distance from the cutting edge.

Excessive build-up is squeezed between the tool and the work and spoils the finish. *Adequate mobility* prevents this, and enables the built-up edge to slough off with the chip.

The "anti-weld" property of the cutting fluid controls the size and mobility of the built-up edge!

In the laboratory and in practice Socony-Vacuum technicians have isolated and studied many other factors necessary in a cutting fluid.

THIS IS NEW, IMPORTANT INFORMATION. It may be able to vitally improve your rate of production!

GARGOYLE Lubricants

SOCONY-VACUUM OIL COMPANY, INC. — Standard Oil of N. Y. Div. • White Star Div. • Lubrite Div. • Chicago Div. White Eagle Div. • Wadhams Div. • Southeastern Div. (Baltimore) • Magnolia Petroleum Co. • General Petroleum Corp.

CALL IN SOCONY-VACUUM

ONE OF A SERIES OF SUGGESTIONS TO AID PRODUCTION

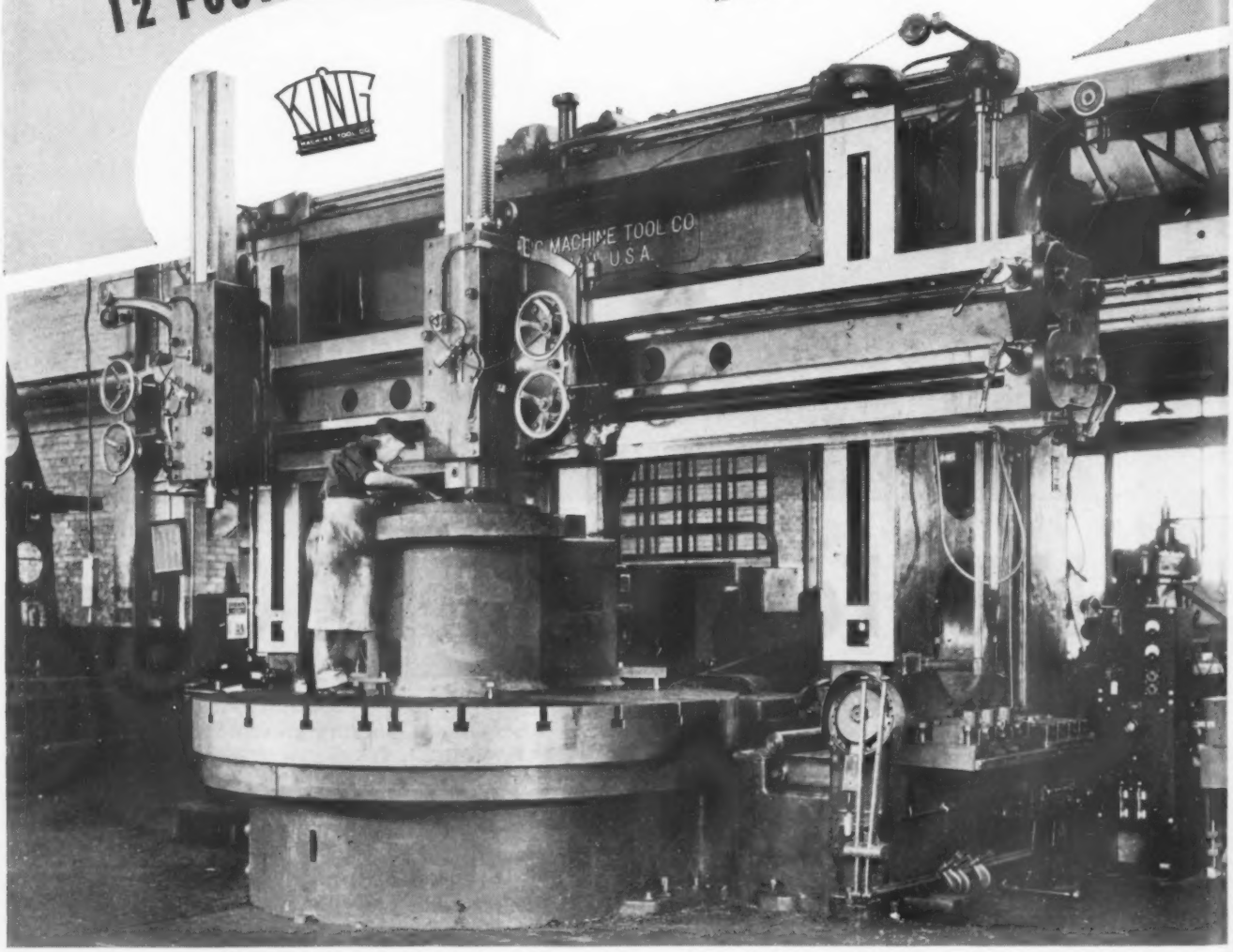
KING

10 FOOT BORING MACHINE EXTENDED TO 12 FOOT SWING

• Here is a King Heavy Duty Vertical Boring and Turning Machine specifically designed to accommodate a particularly wide range of boring and turning operations. The widened machine increasing the normal swing of 10 feet to 12 feet permits it to handle extra wide work as well as regular turning jobs like the one illustrated. The push button control enables operator, from his normal working position, to have instant control of tools—thus increasing production and reducing fatigue.

KING BUILDS

Vertical Boring and Turning Machines in single column types from 30" to 42" and double column up to 13 feet.



The KING MACHINE TOOL Company

BUILDERS OF VERTICAL BORING AND TURNING MACHINES EXCLUSIVELY

CINCINNATI, OHIO

RUGGEDNESS SCORES!

Kempsmith ruggedness and power have paved the way for production victories during the past 54 years...and they continue to play an important part in today's vital job of producing more and better war materials for the United Nations.

KEMPSMITH MACHINE CO.
MILWAUKEE, WIS., U. S. A.

MAXIMILLERS have that surplus of sturdiness needed for heavier cuts...increased range of speeds and feeds ...greater power...centralized control . . . and many other Kempsmith advantages. Available in sizes No. 2, 3, 4 & 5 . . . vertical or horizontal . . . plain or universal.

KEMPSMITH

Precision Built Milling Machines Since 1888

Horton chucks

INDEPENDENT Solid Reversible Jaws Only

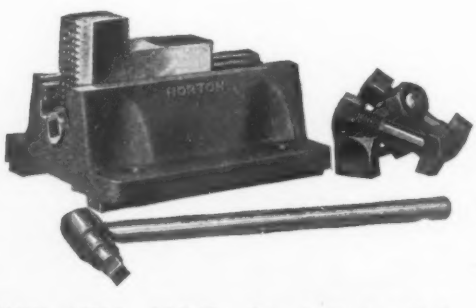
SCROLL UNIVERSAL Two-Piece Jaws Only

For Use With Intermediate Plates On Threaded Spindles

For Key Drive Tapered Nose Spindles

War Production Limited To These Essential Chucks

For Flanged Tapered Nose Spindles
Illustration shows chuck for Type D (Cam Lock) Spindle

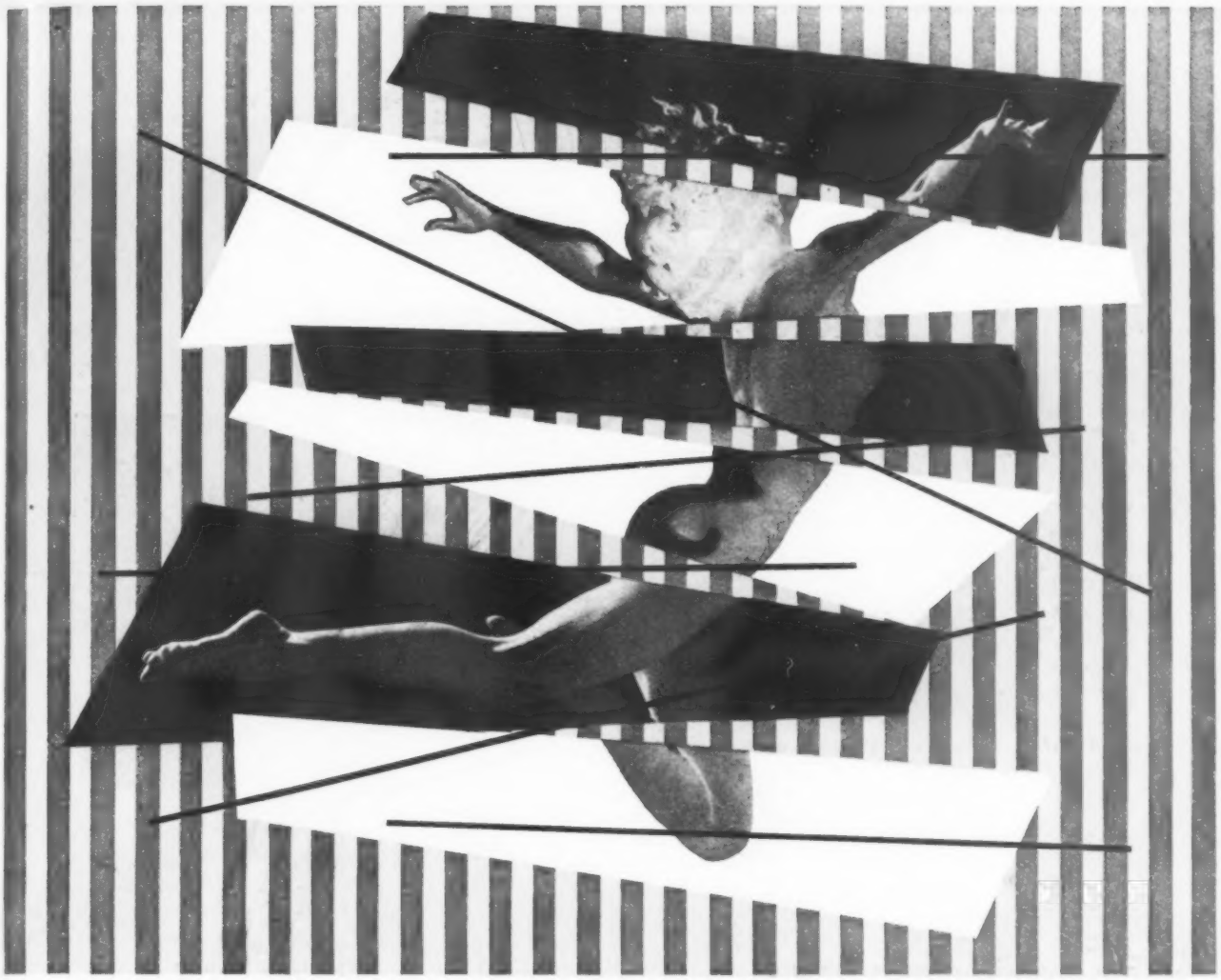


FACE PLATE and BORING MILL JAWS—Steel Body Only

HORTON
MORROW

SINCE 1851 .... THE E. HORTON & SON CO.

WINDSOR LOCKS, CONNECTICUT, U. S. A.



This machine can be improved!

THE HUMAN BODY, we've all been told, is the most perfect machine ever devised. Poets, doctors and engineers all agree on this point.

Yet even the human body is capable of change and improvement. Take life expectancy, for example. Less than 100 years ago it was 35 years...today, it is 63.3! And our soldiers today are 2 inches taller and 14 lbs. heavier than they were during the last war.

The important thing about these figures is this: No matter how highly developed a machine may be...no matter how miraculous its accomplishments may seem, never make the mistake of assuming it cannot be improved. Mistakes like this have caused the failure of more than one flourishing business!

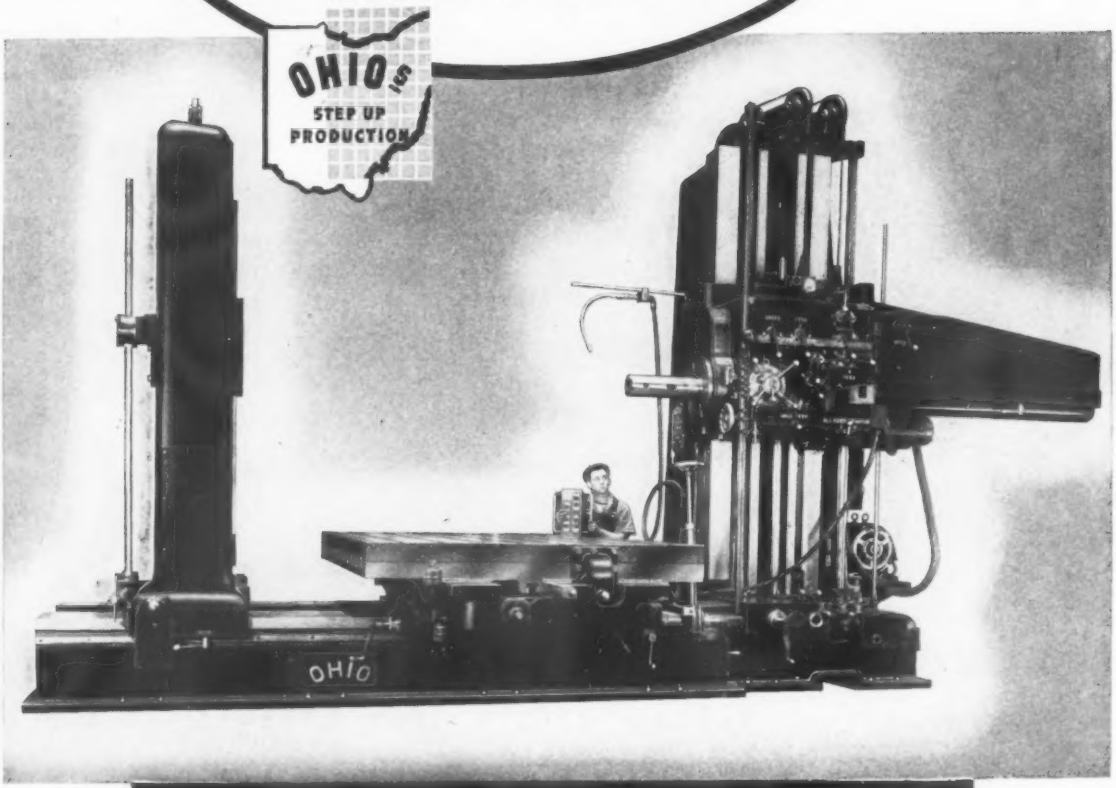
The machine tool industry is busy today making machines to make the 45,000 parts of bombing planes, 40,000 parts for tanks, and the multiple parts and instruments for ships, cannon, rifles, torpedoes and shells. And as a result of wartime experience, even such highly developed machines as Cone Multiple Spindle Automatic Lathes will surely be improved.

Cone Automatics are now being used to help build instruments of war. But in the peace to come, they will again be dedicated to building a better, brighter world.

CONE Automatic Machine Company, Inc., Windsor, Vermont

OHIO HORIZONTAL

BORING, DRILLING AND MILLING MACHINES



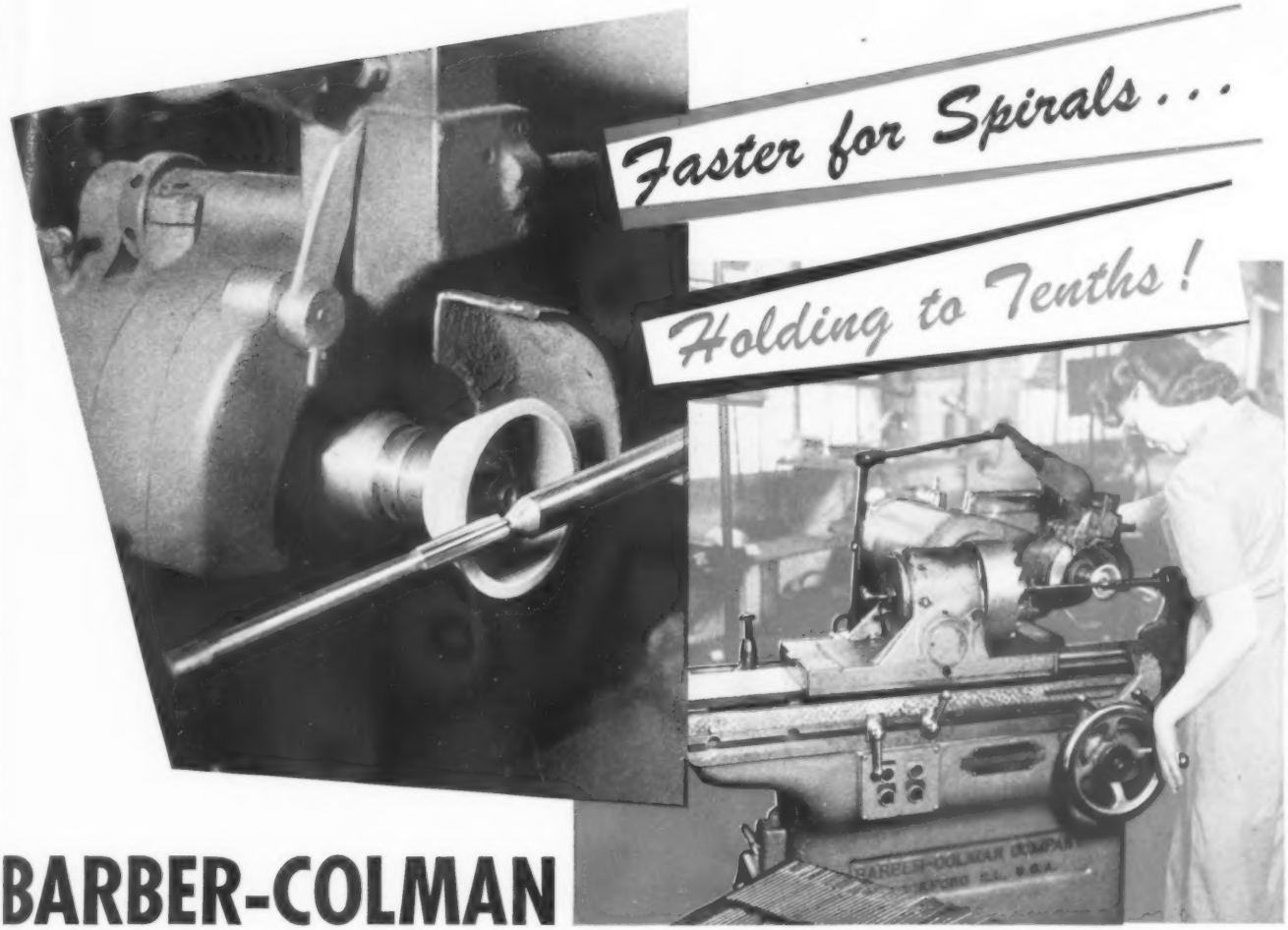
● Here is a new and larger Dreadnaught with all the power, precision and convenience you have learned to expect of these machines. Maximum specifications: 72″ x 132″ table, 60″ wide bed, from 10′ to 20′ between face plate and bar support, 96″ vertical travel of spindle head, 72″ continuous spindle feed. You have anti-friction bearings, automatic lubrication, portable push-button control, unit construction—*every worth-having feature*. Available also in the floor type with corresponding characteristics and a wide range of specifications to meet every need.

THE OHIO MACHINE TOOL COMPANY • KENTON, O.

Prompt Shipments are now offered on these machines.

OHIO DREADNAUGHT

HORIZONTAL BORING, DRILLING AND MILLING MACHINES • SHAPERS • PLANERS



BARBER-COLMAN

Combination Sharpening Machine . . . DOES WONDERS WITH CARBIDE!

"EVERYTHING we could ask for" is the way one manufacturer specializing in cemented carbide tipped tools describes the Barber-Colman Combination Sharpening Machine used in finishing precision counterbores, reamers, drills, and other small tools. They go on to say, "We are able to leave necessary lands or sharpen to edges as prints specify, *holding within tenths.* The Barber-Colman method . . . is much faster, *especially where spirals are concerned,* as well as being more accurate." (The pictures above were taken in this shop.)

The Barber-Colman Combination Sharpening Machine has a number of features which make these results possible. The wheel spindle is mounted in special compensating bearings which render it "dead" for end play at 5000 r.p.m. Precision sine bar control of the work driving head insures accurate spiral lead. Index, operated manually, is governed by a precision latching device and can be set for regular or irregular spacing. Special form cams provide means for obtaining uniform point, nose form, and back taper on reamers or other tools. Setups for a wide variety of work are easily accomplished on this extremely versatile machine. For further information, write for Bulletin F-1486 or see B-C representative.

Buy WAR SAVINGS Bonds

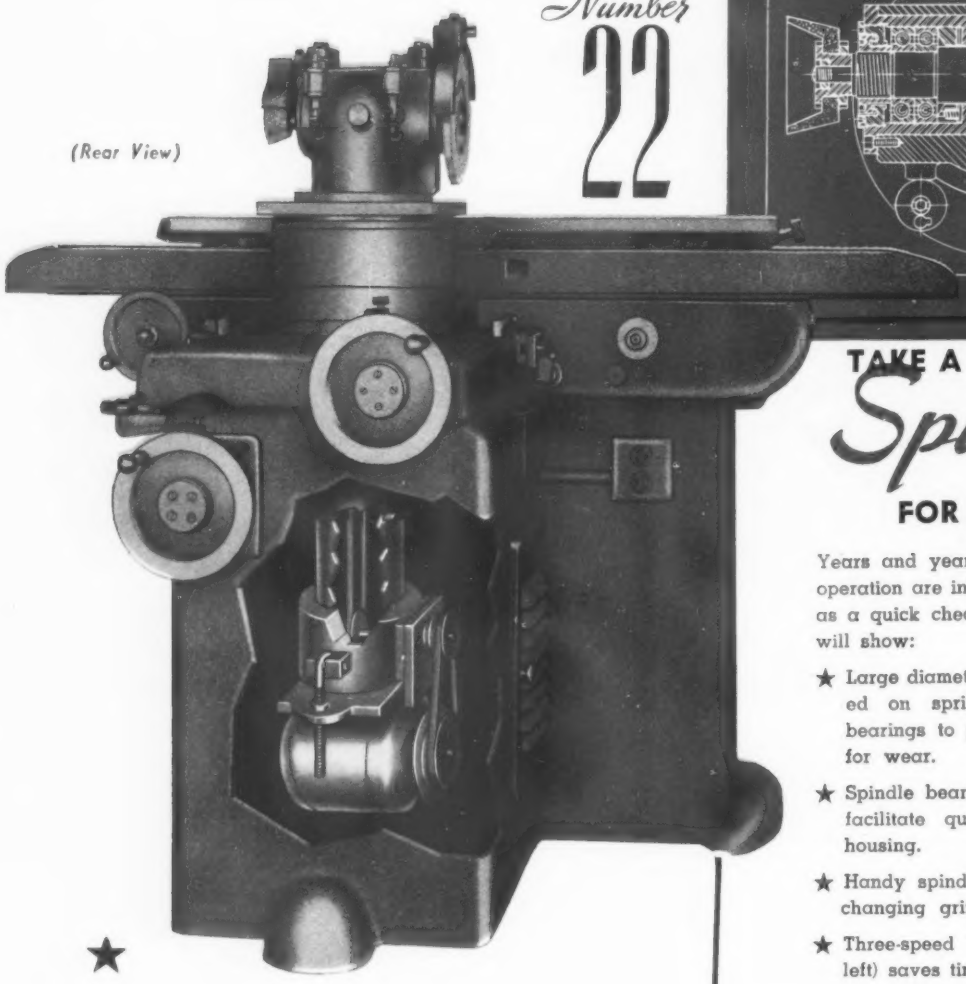
SHARPEN CUTTERS PROPERLY FOR LONG LIFE

Barber-Colman Company

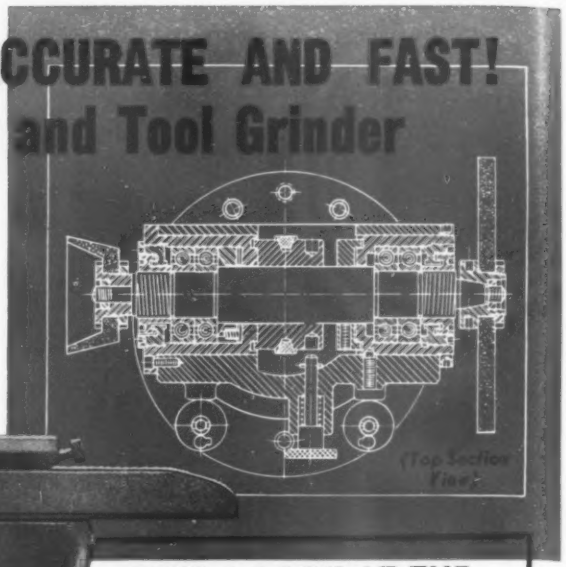
GENERAL OFFICES AND PLANT • 201 LOOMIS STREET • ROCKFORD, ILLINOIS, U. S. A.

NO WONDER IT'S *both* ACCURATE AND FAST!
--this great new Cutter and Tool Grinder

Number 22



(Rear View)



★

SPEED, utmost accuracy and flexibility, so necessary in conditioning today's tools—are assured by sleek, functional design throughout Covel No. 22 Universal Cutter and Tool Grinder. Learn why No. 22 is the Cutter and Tool Grinder for today's tools—and tomorrow's. Prompt Delivery to War Industries.

TAKE A LOOK AT THE *Spindle*

FOR INSTANCE:

Years and years of vibrationless, smooth operation are inherent in No. 22's spindle, as a quick check of these Covel features will show:

★ Large diameter grinding spindle mounted on spring-loaded precision ball bearings to provide automatic take-up for wear.

★ Spindle bearings mounted in quills to facilitate quick, easy removal from housing.

★ Handy spindle lock saves time when changing grinding wheels.

★ Three-speed V-belt drive (see cut at left) saves time when changing speeds to compensate for grinding-wheel wear.

★ Spindle's left-hand end is tapered for grinding-wheel collets, right-hand end is straight to accommodate small diameter cup grinding wheels — provides flexibility, saves time on many grinding operations.

Write, wire or phone for Bulletin A 43 and name of nearest dealer.

Shorten employee-training time with Covel equipment.

Grinding Machinery Since 1874

COVEL INDUSTRIAL GRINDERS

COVEL MFG. CO., BENTON HARBOR, MICH.

MID-WEST ELIMINATED BLIND HOLE TAPER

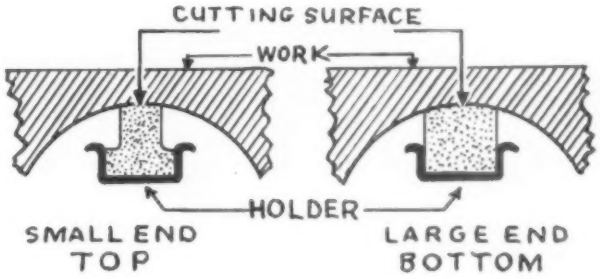
by Producing a Tapered Stone!

Research, builder of better things, quite often will produce some tool, device or gadget so simple in basic principle that one automatically wonders why it wasn't obvious at the outset. Such a product of research is MID-WEST'S tapered honing stone, developed and built to prevent the creation of taper in honing blind holes.

This unique stone (pictured herewith) was developed by MID-WEST engineers after several experiments with variously designed hones had failed to fully answer the purpose. The creation of taper in blind hole honing, of course, is caused by the absence of "overhang" at the blind end of the hole, which, in turn, causes that end to receive less cutting action than is possible at the open end. In the tapered stone, therefore, MID-WEST has equalized the cutting action by reducing the stone's working surface at one end. The best test of their efforts is that the stone DOES eliminate taper.

The tapered honing stone is but one example of the research, care, patience and training that goes into the manufacture of MID-WEST abrasive products — honing and superfinishing stones, grinding wheels, sandpapers, rubbing bricks, caulking compounds, polishing wheel cements, et cetera. That's why they cut faster, produce finer finishes, last longer. And that's why we contend they are the world's *most efficient* abrasives.

Our engineers can help you solve any honing or grinding problem. You are invited to call upon us for this free service anytime.



MID-WEST ABRASIVE COMPANY

Manufacturers of DEPENDABLE Abrasives

1960 E. MILWAUKEE AVENUE — DETROIT, MICHIGAN

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

Mid-West

★ *Honing Stones*
★ *Superfinishing Stones*
★ *Grinding Wheels*
★ *Emery Cloth*
★ *Sandpaper*

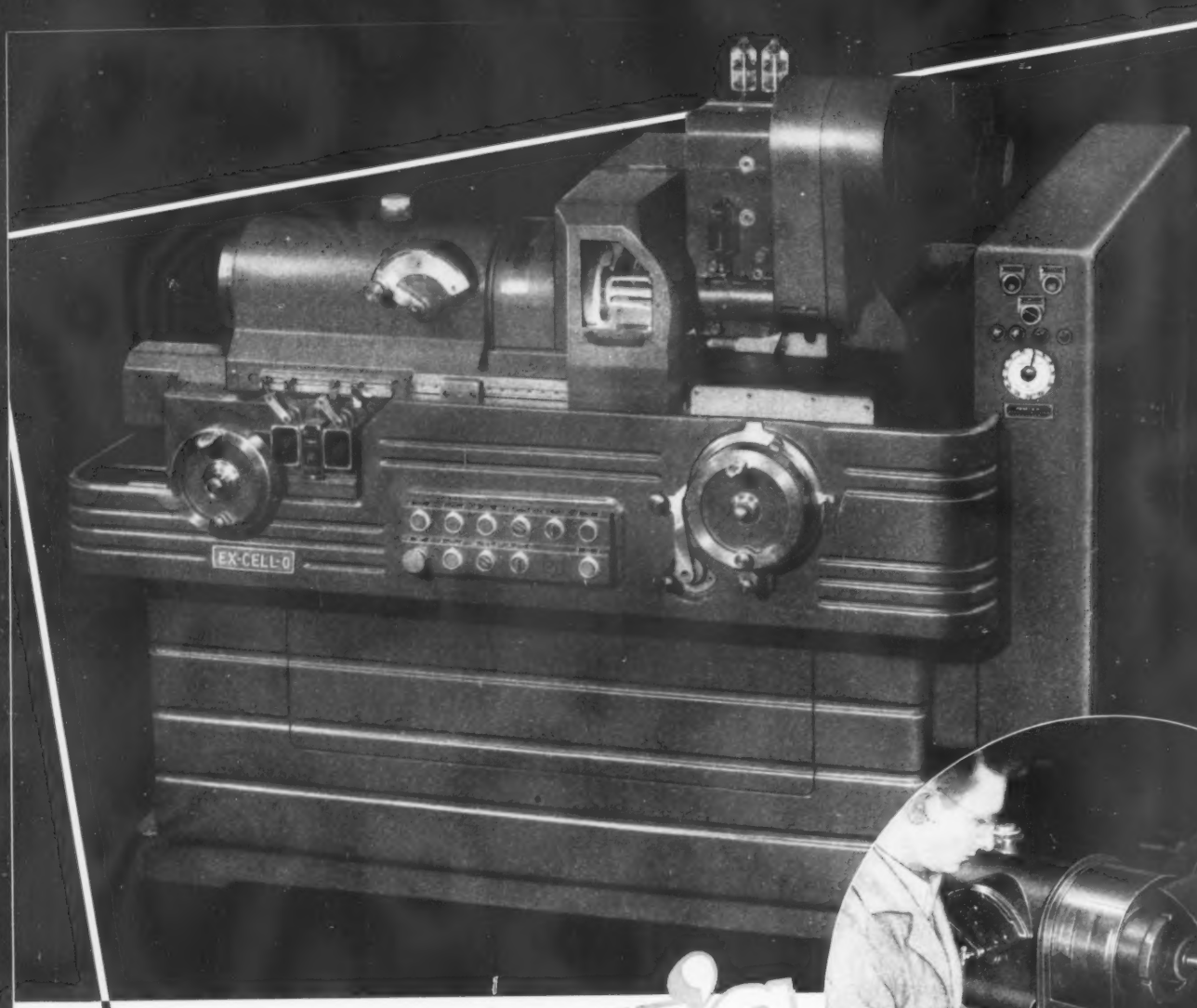
Mid-West Abrasive Company,
1960 E. Milwaukee Avenue,
Detroit, Michigan

Gentlemen: Please send me additional information on Mid-West Micro Bond honing and superfinishing stones.

*Name*_____

*Company*_____

*Address*_____



TO LEFT: 39-A Intern
—one of nine mode
styles of Ex-Cell-
Standard Precis
Thread Grinde
being widely u
today by war p
duction industries

BELOW: Precisi
grinding intern
thread on aircr
part, typical of th
sands of war p
duction parts be
accurately, speed
and economica
ground on Ex-Cel
precision thre
grinders.

TODAY'S PRODUCTION CALLS FOR EX-CELL-O PRECISION

Ex-Cell-O's wide experience in designing and building precision machine tools makes Ex-Cell-O engineers exceptionally familiar with production requirements in today's emergency. Take, for instance, precision thread grinding, almost indispensable in the aircraft and other war industries where hardened threaded parts must be finished to the highest degree of accuracy. Ex-Cell-O engineers have designed nine standard thread grinders—automatics, universals, plain production machines. This variety in style and the flexibility in use of these Ex-Cell-O machines enable a manufacturer to select a standard machine that will meet specifically his exact thread grinding requirements today and provide him with equipment that can be readily and profitably adapted to production of civilian needs tomorrow. Because of their soundness in design, their thoroughness in construction, their simplicity and efficiency of operation, and their modern styling, Ex-Cell-O standard thread grinders are proving the first choice of America's war production industries.

EX-CELL-O CORPORATION • DETROIT

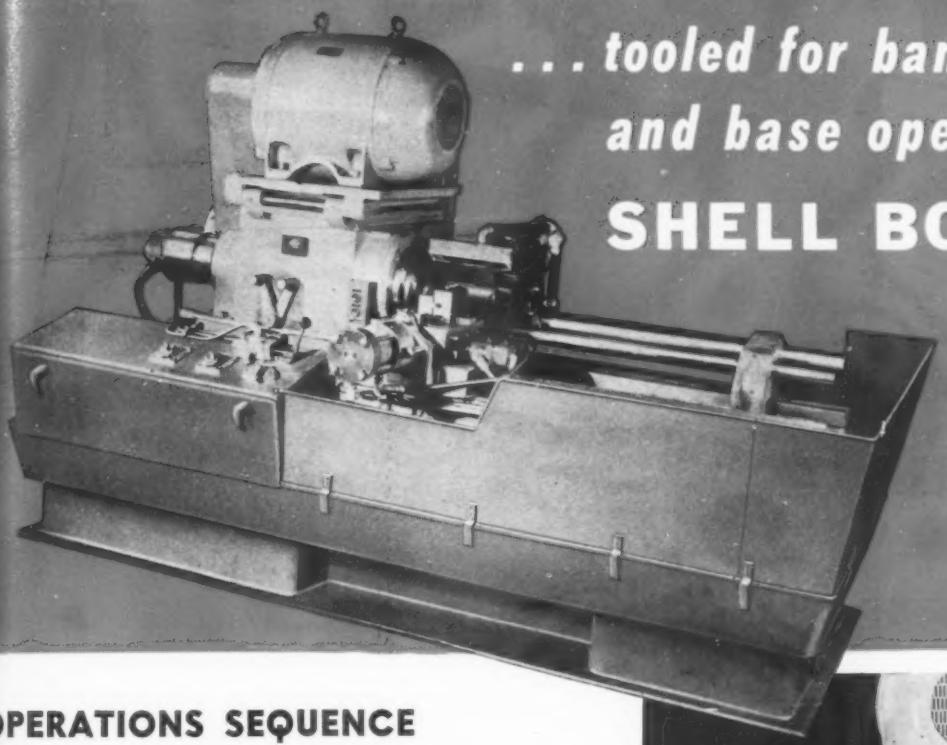
XLO

EX-CELL-O *means* PRECISION

THREAD GRINDING, BORING AND LAPPING MACHINES • TOOL GRINDERS • HYDRAULIC POWER UNITS • GRINDING SPINDLES • BROACHES • CUTTING TOOLS • DRILL JIG BUSHINGS • DIESEL FUEL INJECTION EQUIPMENT • R. R. PINS AND BUSHINGS • PRECISION PARTS

THE NEW SPARKS SEMI-AUTOMATIC HYDRA FEED CHUCKING LATHE

. . . tooled for band grooving and base operations on SHELL BODIES



Versatility of tooling and holding equipment adapt the SPARKS SEMI-AUTOMATIC LATHE for all operations on shell bodies from 75 m/m to 155 m/m inclusive.

High production is assured when the SPARKS is tooled, as shown here, for band groove and base operations on 75 m/m shells.

OPERATIONS SEQUENCE

Front tool cuts band groove, the tools moving into and away from work automatically. Rapid traverse is provided for non-working movements while feed movements are controlled by metering valve.

Back tools, timed in sequence with front tool, handle facing and cut-off. Rapid traverse and feed similar to front tool are provided.

Relief of tools on return movements to eliminate tool marks is hydraulically operated and automatic.

All tool movements are automatic. Shifting of manual starting valve handle starts the operations cycle, and automatically operates clutch and brake for spindle starting and stopping.

Quick loading and recovery of shell are handled by another hand valve actuating hydraulically controlled collet jaws.

A simple change of collet and tooling provides for the machining of 90 m/m shells. However, this machine is capable of machining a wide range of parts aside from those involved in armament production.

CONDENSED SPECIFICATIONS

Swing over ways—21″
Swing over carriage—12″
Ball and roller bearing headstock with 4 selective speeds

SEND AT ONCE FOR COMPLETE DETAILS

SPARKS HYDRA-FEED LATHE

SPARKS MACHINE TOOL CORPORATION
NORWALK . . . . CONN.

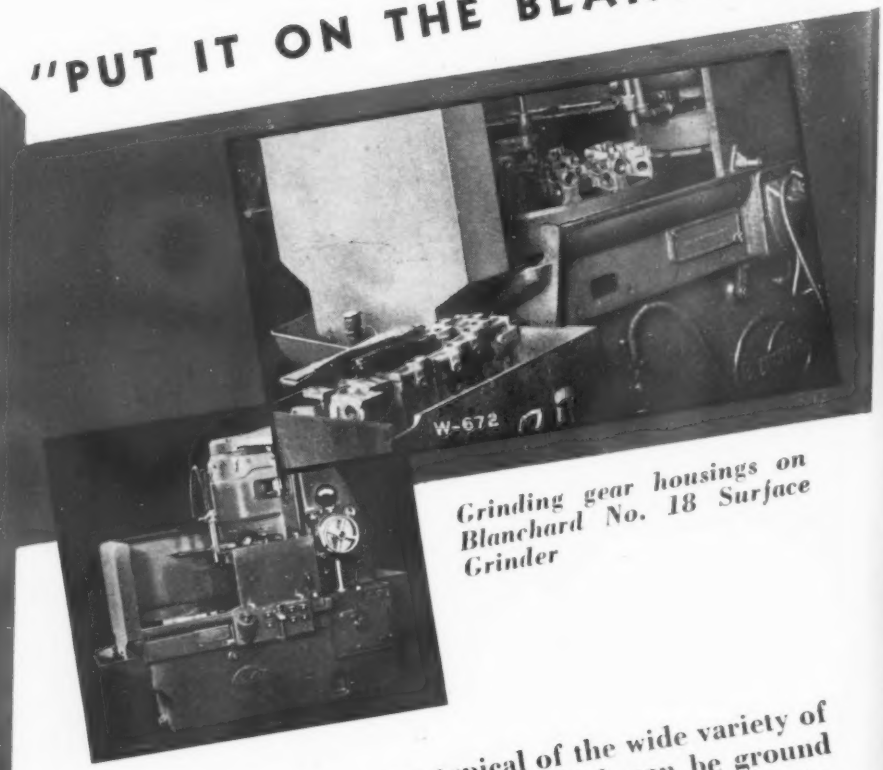
BLANCHARD

"PUT IT ON THE BLANCHARD"

CHECK THESE ADVANTAGES OF BLANCHARD GRINDING

- ★ **Production**
- **Adaptability**
- **Fixture Saving**
- ★ **Operation Saving**
- **Material Saving**
- **Fine Finish**
- ★ **Flatness**
- ★ **Close Limits**

★ . . . . . *Especially valuable on jobs like the one illustrated.*



Grinding gear housings on Blanchard No. 18 Surface Grinder

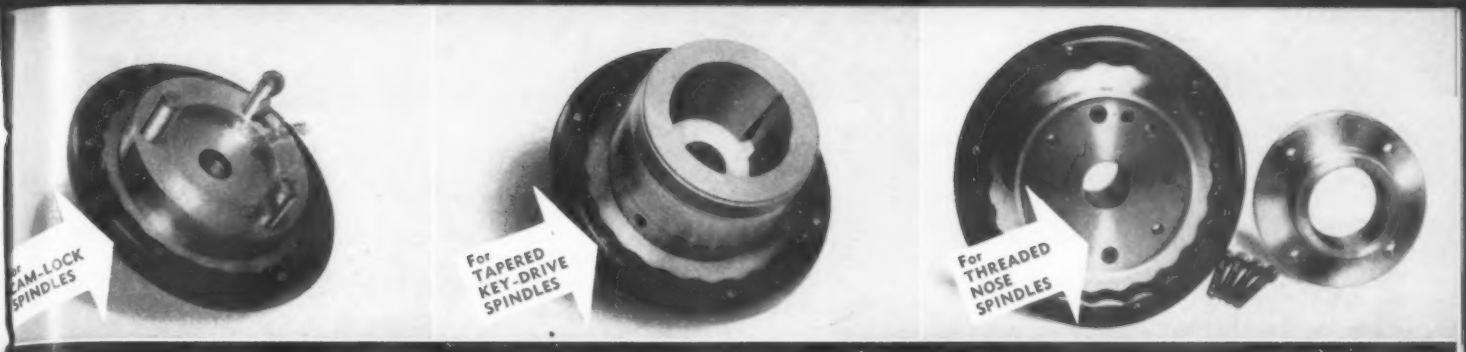
THESE gear housings are typical of the wide variety of small cast iron and steel parts which can be ground better on a Blanchard No. 18 Surface Grinder. The parts require a smooth surface for an oil-tight joint. 1/16" of stock is removed from one side of these cast iron housings to limits of ±.0002". 50 pieces are produced per hour.

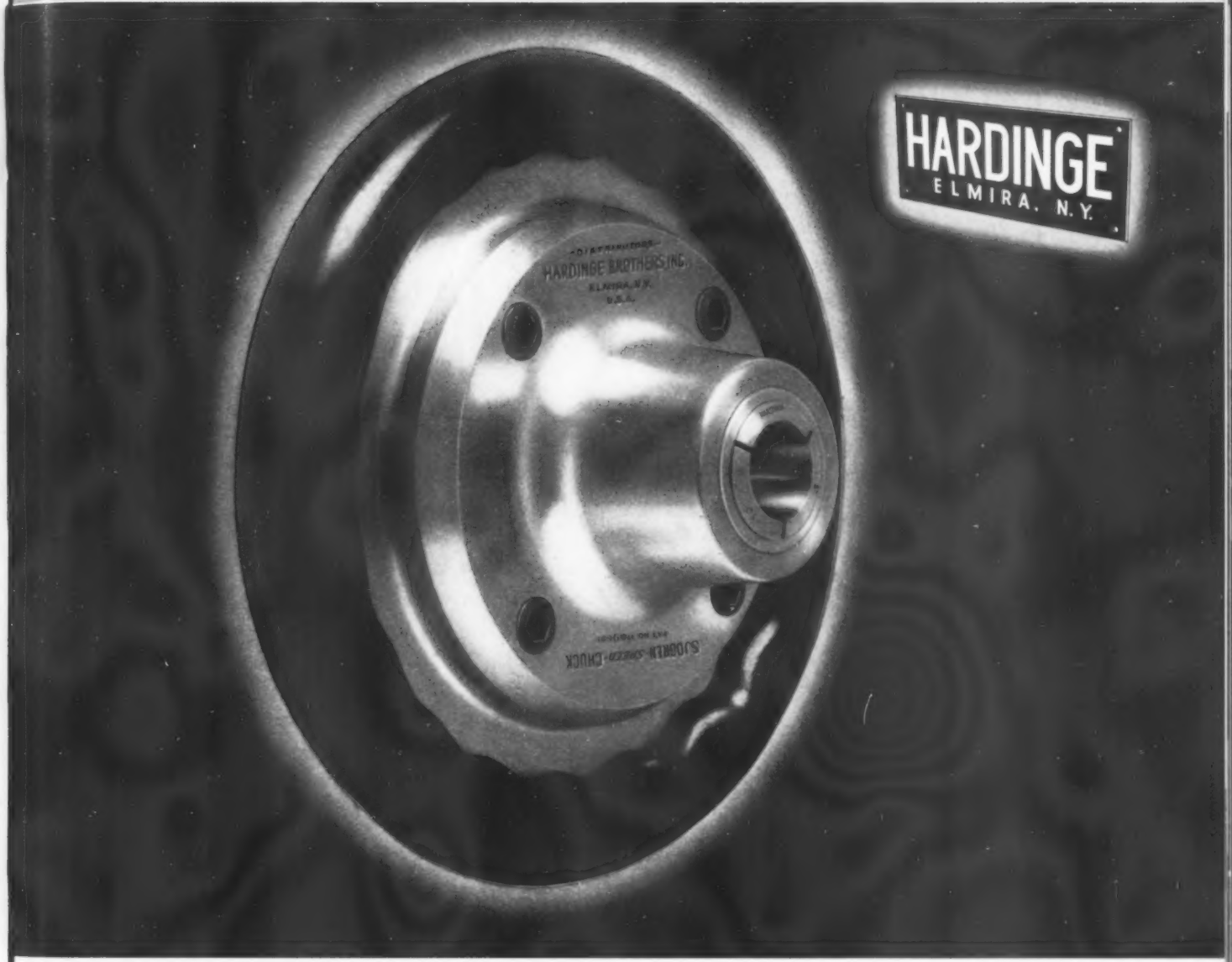
By Blanchard Grinding, assembly costs can be reduced, hand fitting and scraping eliminated. Other advantages on such pieces are—saving fixture expense, no chipping of corners; chilled or sandy castings cause no difficulty. High production with accuracy is easy the Blanchard way.

The BLANCHARD MACHINE COMPANY

64 STATE STREET, CAMBRIDGE, MASS.

Send for your free copy of "Work Done on the Blanchard." This book shows over 100 actual jobs where the Blanchard Principle is earning profits for Blanchard owners.





HARDINGE-SJOGREN

SPEED COLLET CHUCKS

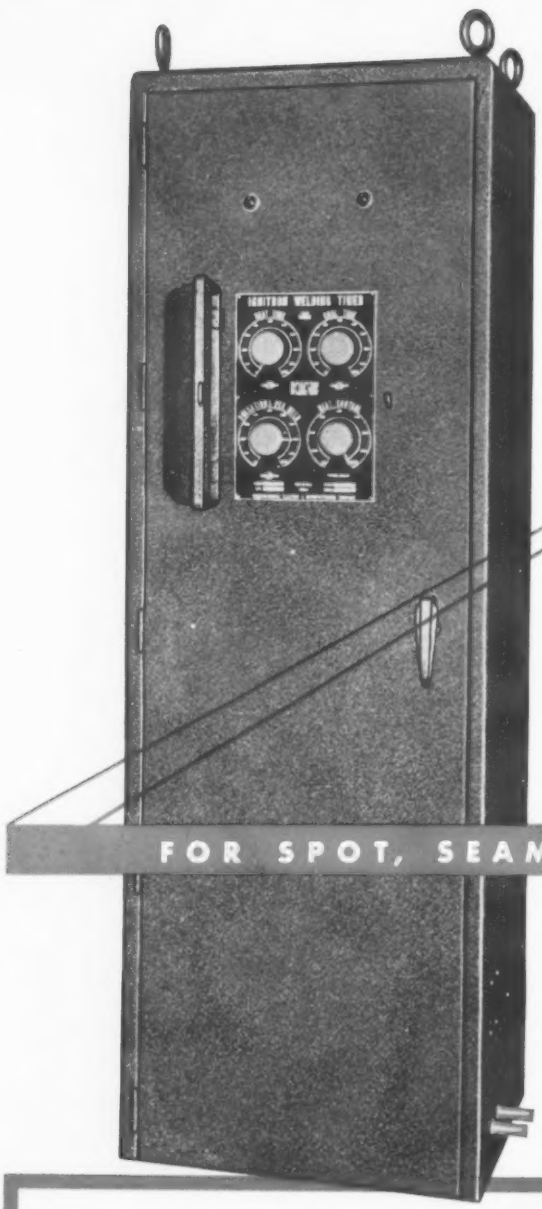
A HARDINGE-SJOGREN Nose Type Speed Collet Chuck enables you to get full value from your investment in tool-room lathes, engine lathes and milling machines. It gives greater capacity, saves time, increases accuracy and assures better results.

The amazingly fast action of the HARDINGE-SJOGREN Speed Collet Chuck gives it full right to its name. An almost effortless turn of the handwheel, one way or the other, automatically opens or closes the collet, releasing or gripping the work as desired. Its grip is adjustable and sure.

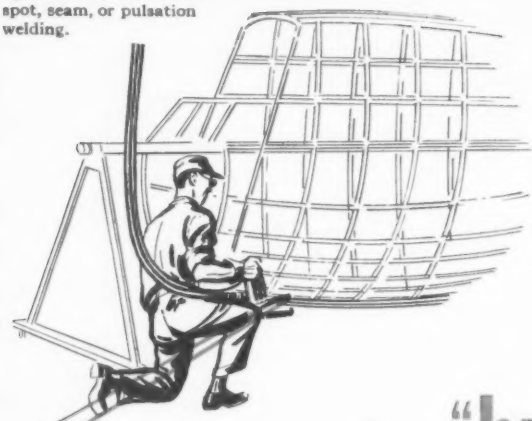
Three sizes, 1", 1⅜", or 1¾" collet capacity.

Ask for complete bulletin.

"PERFORMANCE HAS ESTABLISHED LEADERSHIP FOR HARDINGE"



Timer illustrated is a Type SX Combination Synchronous Timer for spot, seam, or pulsation welding.



NO MORE "burned" OR "cold" SHORT-TIME WELDS WITH

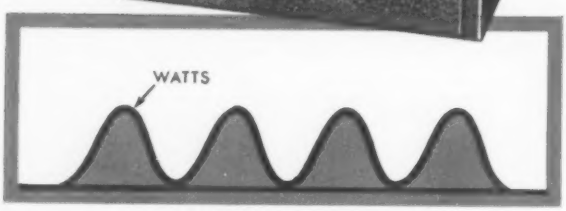
Westinghouse Synchronous Timers

FOR SPOT, SEAM OR PULSATION WELDING

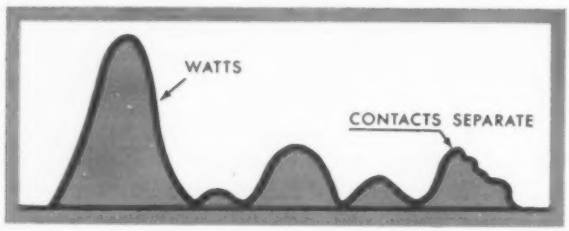
Where welding time of a few cycles only is required for critical metals and small parts, random (nonsynchronous) switching seriously affects the quality of the weld. This is because initial surge currents can cause as much as 50% variation in the heat produced in a weld—producing either a warped, burned, or weak, cold weld.

Westinghouse Synchronous Timers eliminate unpredictable "transients" or current surges by always starting and stopping the weld current at the zero point on the current wave, or later (when heat control is used). As a result, each weld duplicates the quality of the preceding one because the wave form is the same.

These timers make possible a rigorous system of quality control that insures consistent welding of critical alloys and thin materials. Stainless steel, for example, can be welded without loss of stainless properties. Discoloration and electrode "pick-up" can be reduced. Investigate the possibilities of Westinghouse Electronic Control for your resistance welders. Ask your Westinghouse Representative for Booklet B-3102. Or write Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N. J-21223



SYNCHRONOUS TIMING
Starting and stopping at zero point produce even wave form—uniform "heat".



NONSYNCHRONOUS TIMING
Random (nonsynchronous) switching may produce this wave form—unpredictable "heat".

Westinghouse

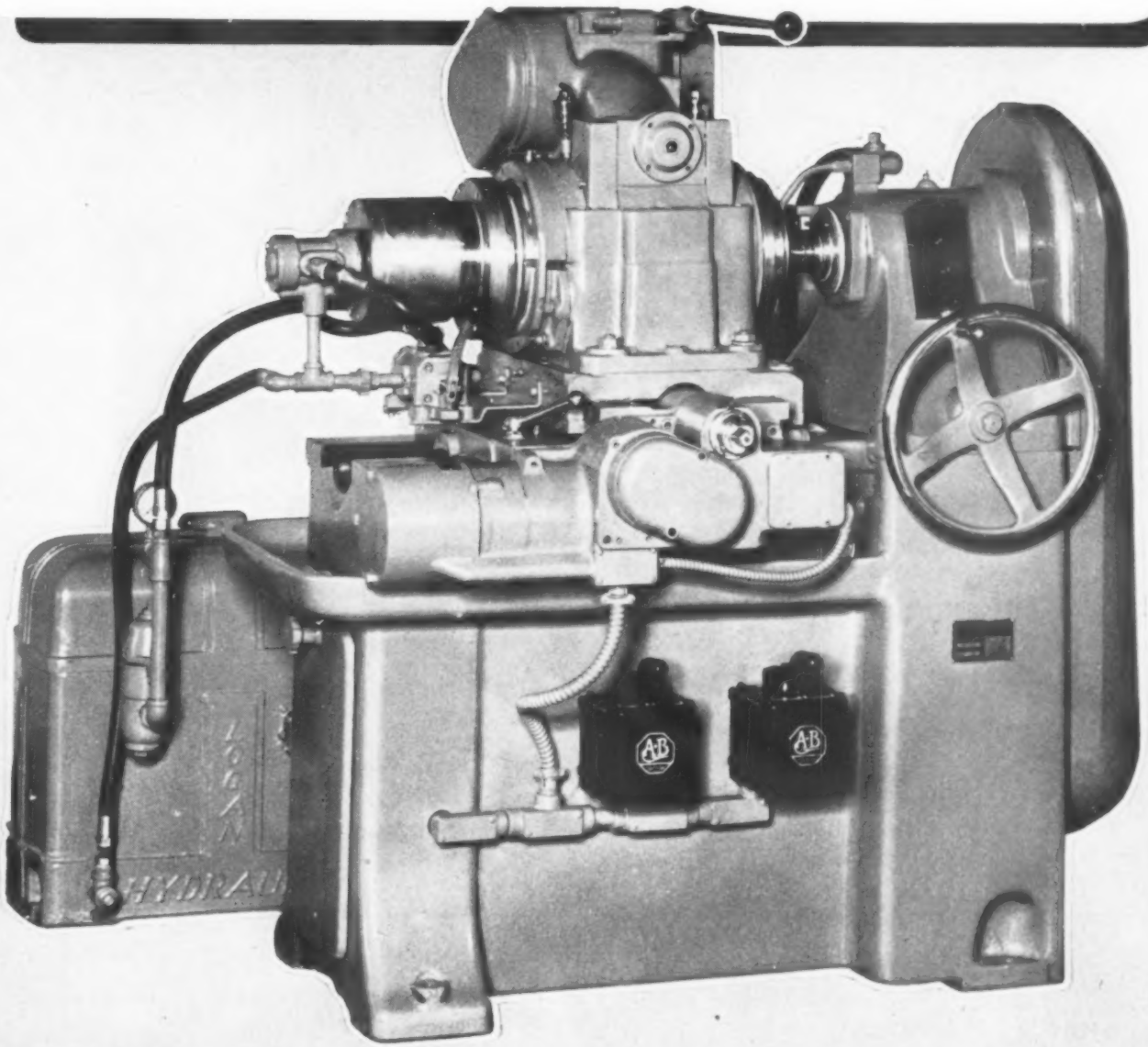
RESISTANCE WELDING CONTROL

Another Boost to War Production

LEES-BRADNER
MODEL 40
PRODUCTION THREAD MILLER
arranged with
POWER COLLET CHUCKING

● The Lees-Bradner Model 40 Thread Miller's high productive capabilities can be greatly augmented by the use of air or hydraulic actuation of the collet chucking arrangement. Additionally — operator fatigue is minimized by this power chucking method. Why not investigate?

Our tool engineering facilities are at your disposal to assist you in the solution of your precision threading problems.

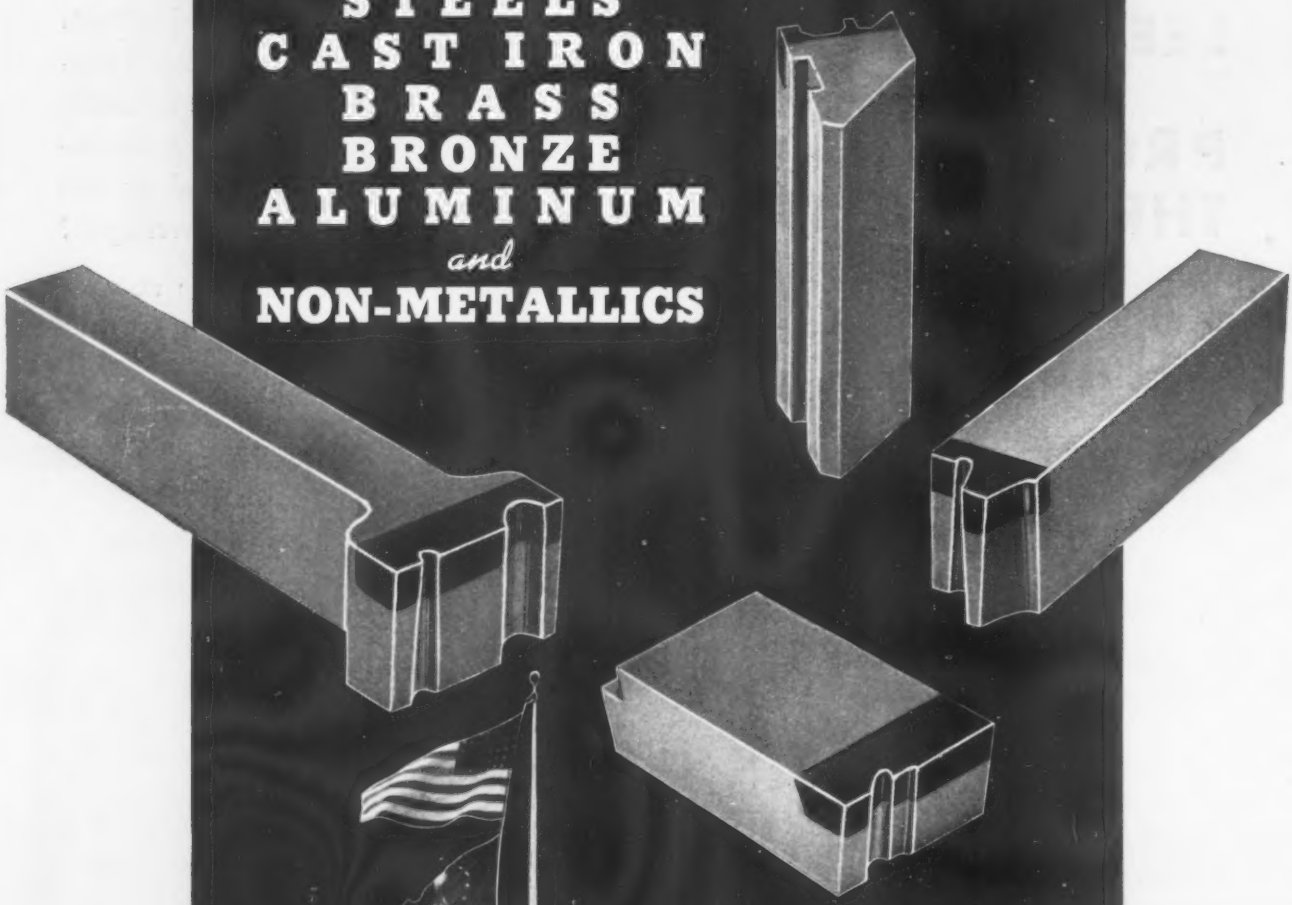


The LEES-BRADNER Company

CLEVELAND, OHIO, U.S.A.

CARBIDE TIPPED TOOLS

FOR MACHINING OF
STEELS
CAST IRON
BRASS
BRONZE
ALUMINUM
and
NON-METALLICS



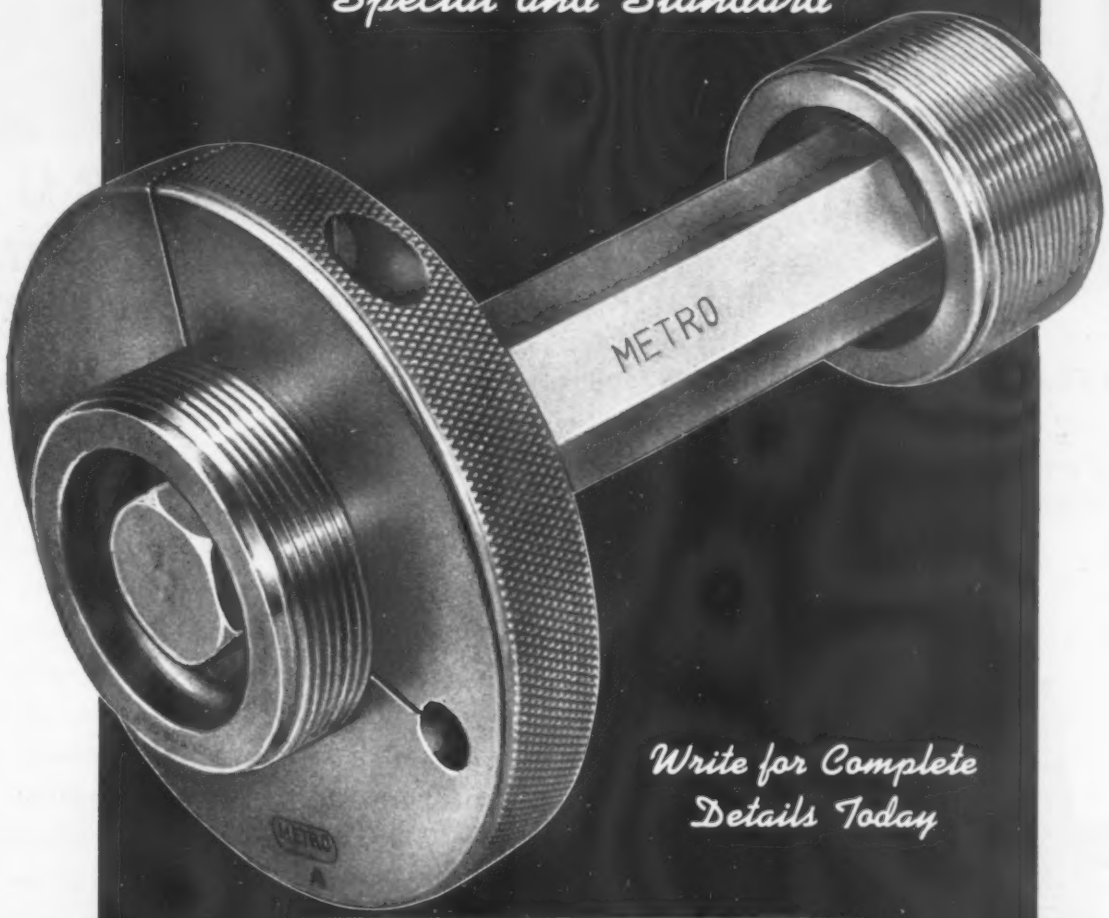
WRITE TODAY ABOUT YOUR REQUIREMENTS

A MODERN PLANT . . . MODERN METHODS . . . FOR PRECISION TOOLS AND GAGES

PRECISION GAGES

THREAD AND PLAIN PLUG AND RING GAGES

Special and Standard



Write for Complete Details Today

• Skilled men assemble gages and check for accuracy and conformance to specifications.

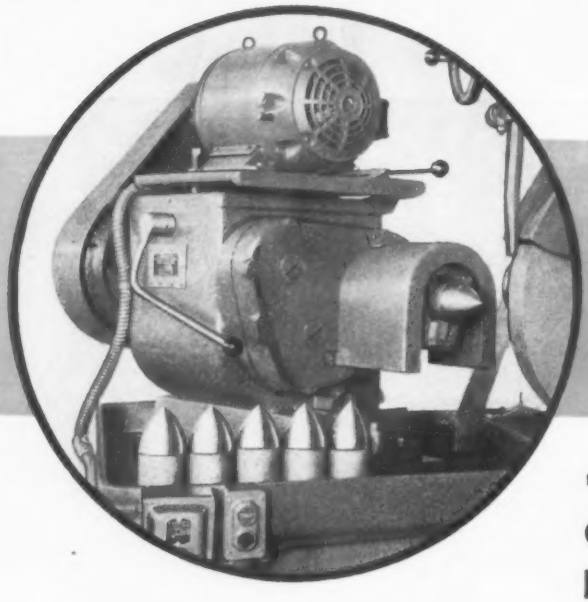
• Inspection is done in an air-conditioned room where temperature is kept at 68° F.

• Part of Metro's modern machine shop where highest accuracy and precision is maintained.

METRO

TOOL AND GAGE CO.

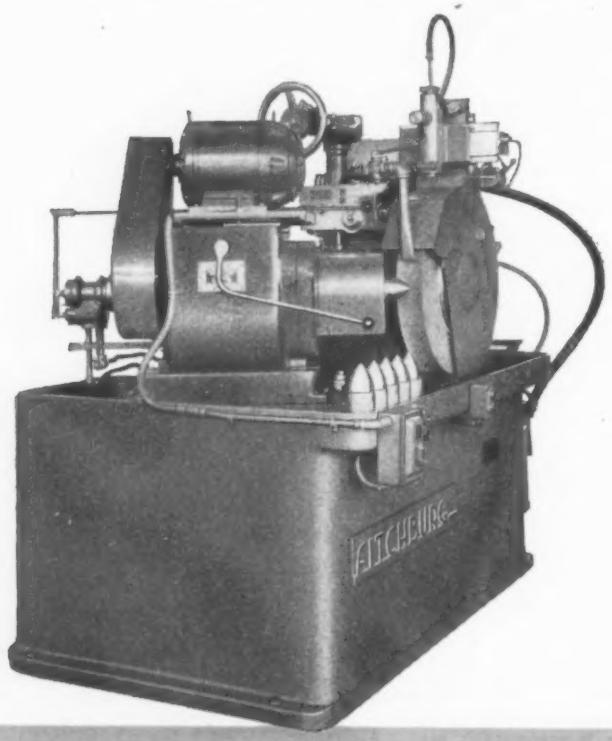
4240 PETERSON AVE.
CHICAGO, ILL.



on Grinding jobs like this

. . . FITCHBURG OFFERS SPECIAL ADVANTAGES IN MASS PRODUCTION

This Fitchburg special Chucking Grinder with a heavy duty headstock, is designed for grinding the ojive of armour piercing shells. The wheelhead is a Fitchburg Standard Bowgage Unit carrying a 24" x 3½" face wheel. A hydraulic form trueing device is mounted on the wheelhead.



To operate this machine the operator places the shell in the open jaw chuck, then, by pushing a ball lever forward, closes the chuck, clamping the work piece at a definite distance from the bottom of the shell. To start the work rotation, operator depresses the long lever and pushes the button to start the automatic grinding cycle.

When installing special precision grinding equipment, it is well to remember that the Fitchburg Bowgage Grinding Wheelhead is a standard unit. It can be remounted on standard machines, or on new special bases, for operations other than the one originally specified. This feature protects your investment.

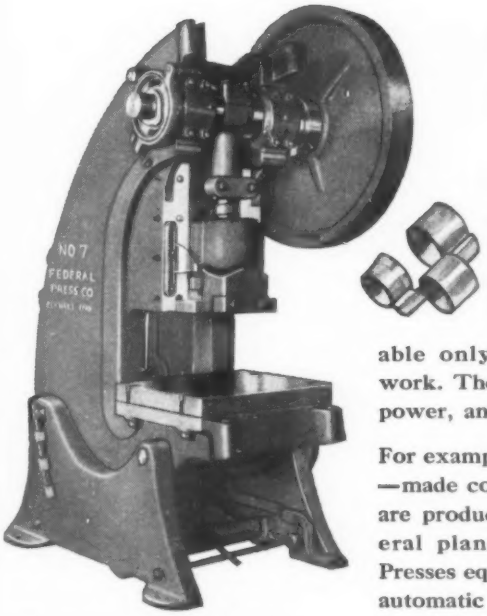
. . . Write today for folder giving complete details.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of—Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.

FOR SPECIALIZED WAR JOBS



STANDARD FEDERAL PRESSES SAVE TIME — MANPOWER — EXPENSE

Standard Federal Presses are now producing scores of war items which formerly would have required special machinery with limited utility, suitable only for highly specialized work. They are saving time, manpower, and reducing costs as well.

For example, machine gun belt links —made complete from strip stock— are produced at high speed in several plants on standard Federal Presses equipped with roll feeds and automatic stops. This sensitive stop was developed by Federal to give intricate dies protection in case stock is fed improperly. Operating off the crankshaft by a cam, this automatic feature stops the press at the top of a stroke whenever the work is not in exact position. Standard Federal Presses can be quickly adapted to many specialized jobs and are now serving their owners in a variety of unusual ways to help win the war.

If you have any jobs requiring specialized press work, get the facts from Federal. Write today for latest literature, or for help in working out a specific problem.

9 FEDERAL SIZES

Federal Open-Back, Inclinable Presses are available in nine sizes, with capacities ranging from six to 80 tons—either flywheel or geared type. They are the products of 40 years' experience in press building.

FEDERAL
OPEN-BACK—INCLINABLE
PRESSES

THE FEDERAL PRESS CO.
301 Division Street, Elkhart, Indiana

"AMERICANS"

In Action For War Production

The war program demands not only all available man hours for production, but machine tools that will make those man hours most productive.

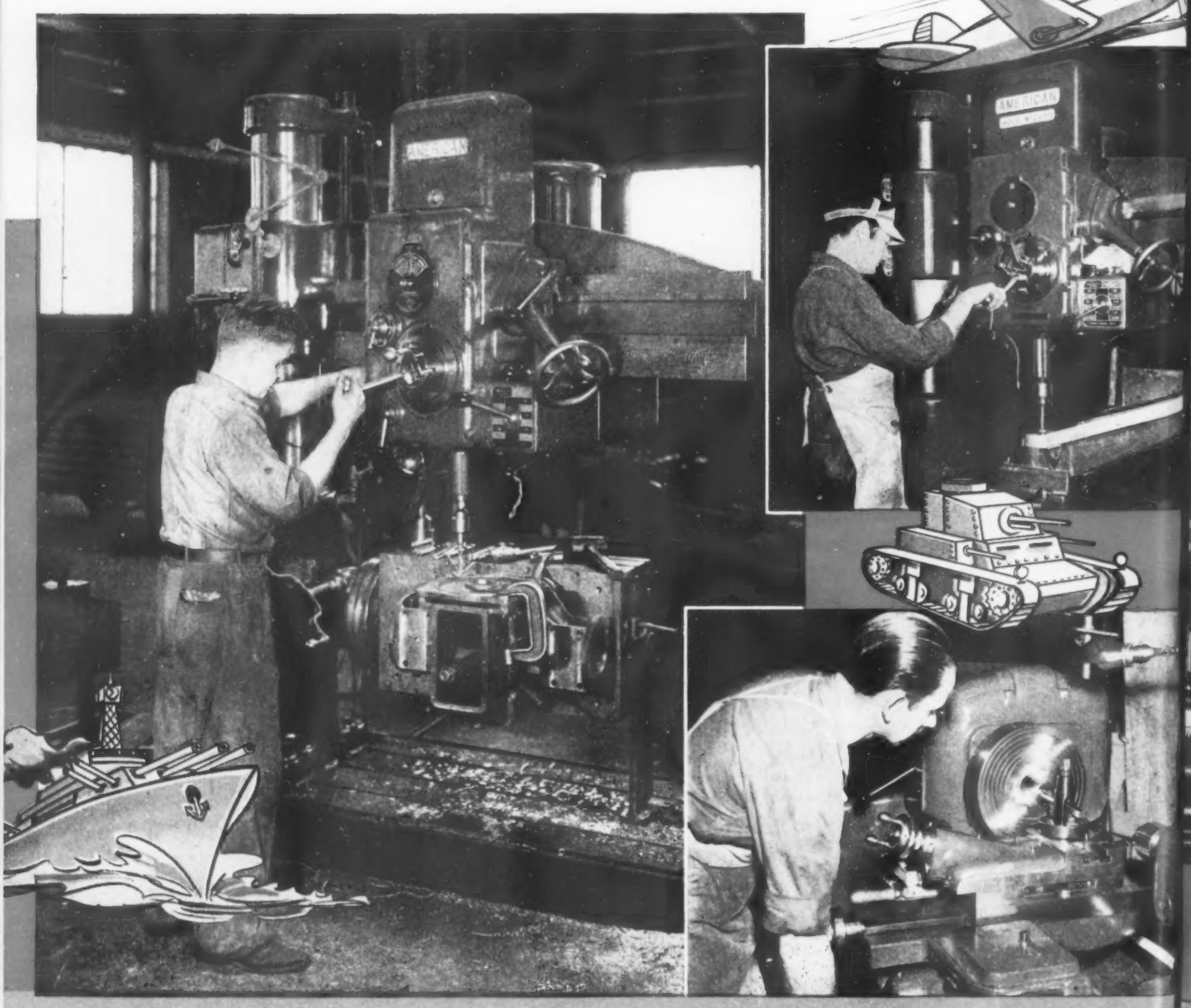
In every war industry "Americans" are contributing to the speed-up demanded by the present emergency. In every one of these industries their performance has established them as leaders in the battle for faster, lower-cost production. Their adaptability, speed, power, precision and stamina have won for them undisputed leadership in the production lines of o largest and most prominent war contractors. "American have gone into action in a big way for War Production.

The accompanying pictures show "American" Pacemaker Lat and "American" Hole Wizard Radials hard at work meeti demands of the war program in the production of airplan tanks, guns, shells, engines, precision instruments, battlesh and tractors.

THE AMERICAN TOOL WORKS COMPANY

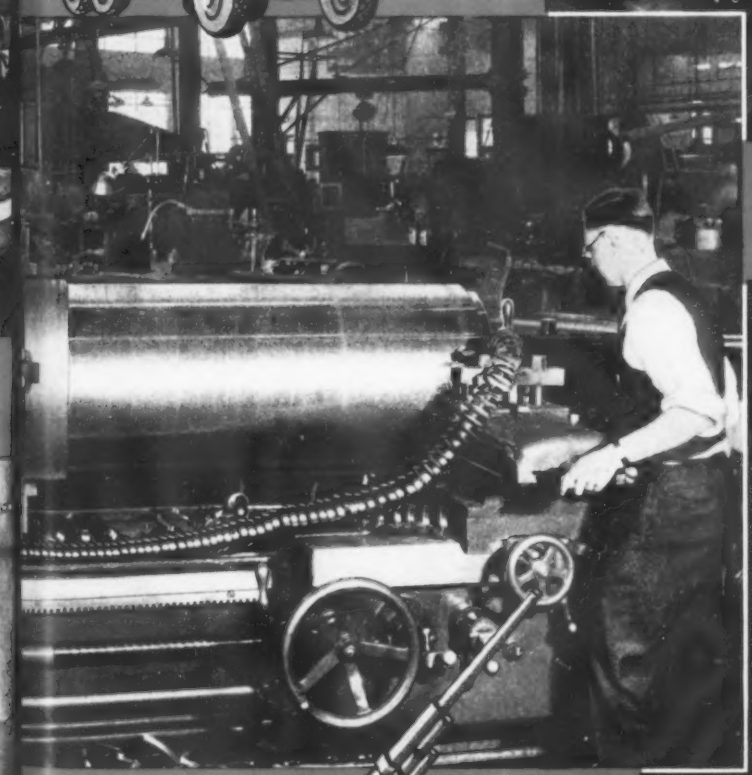
CINCINNATI, OHIO, U. S. A.

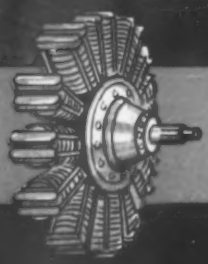
LATHES · RADIALS · SHAPERS

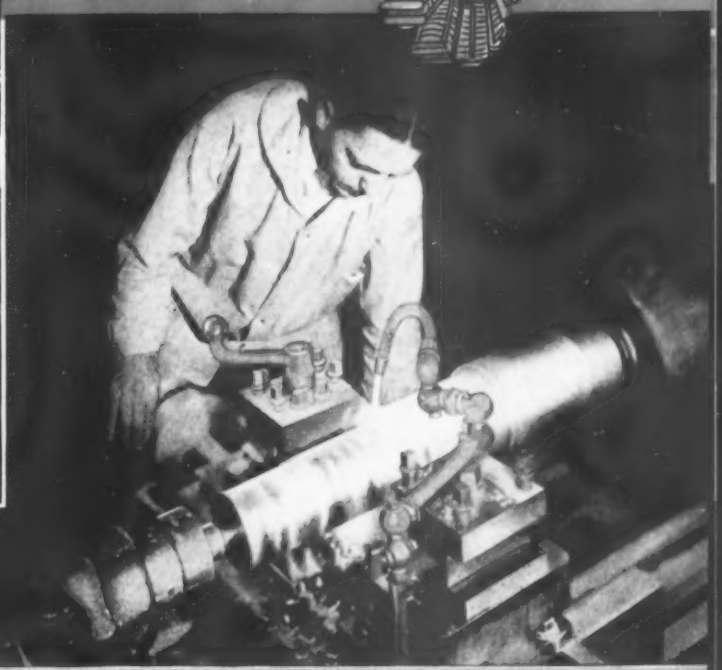


"AMERICANS" *in Action...*

THE AMERICAN TOOL WORKS COMPANY
CINCINNATI, OHIO, U. S. A.
LATHES - RADIALS - SHAPERS





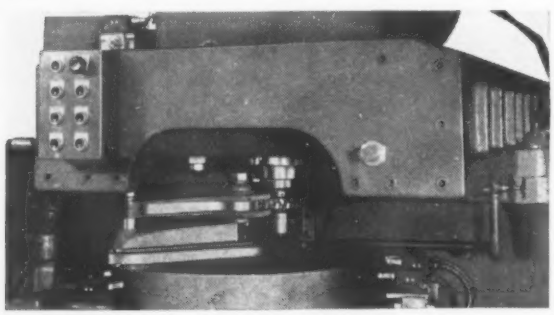


Big DAVIS & THOMPSON *Roto-matics* FULLY AUTOMATIC

Speed Up VICTORY PRODUCTION

Here is another unique example of how Davis & Thompson specially designed automatic machines combine sensational production speed with finest precision to assure the safest fighting planes and best of battle weapons to hasten Victory:

This D&T high production machine has a 34″ rotary table (hydraulically operated by oil motor) mounted on a sliding table of 44″ movement (driven by another oil motor actuating a screw), with vertical spindle head for feed or rapid traverse forward or reverse (run by a third oil motor, through a screw).



In approximately 20 steps, automatically actuated by solenoid valve controlled limit-switches, the machine completes all the intricate rough- or finish-milling of the channel operations on connecting rods for aircraft engines . . . with speed that cuts time to a fraction of former methods . . . with uniform precision . . . conserving vital metal by reducing rejections . . . saving manpower by automatic operations, completing either job on a single setup, and simplifying inspections.

In war or peacetime, Davis & Thompson engineers boost production and cut costs with specially designed machines. You will find this organization well qualified and equipped to analyze your production and to speed output.

Write for copy of the "Victory Production" book.

DAVIS & THOMPSON CO., Milwaukee, Wis., U. S. A.

Buy **WAR BONDS** *and* **STAMPS**

D&T ROTO-MATIC HIGH PRODUCTION MACHINERY

UNPRECEDENTED OUTPUT

in war production...

...an achievement in which

P&J *Automatic* CHUCKING EQUIPMENT

plays an important part

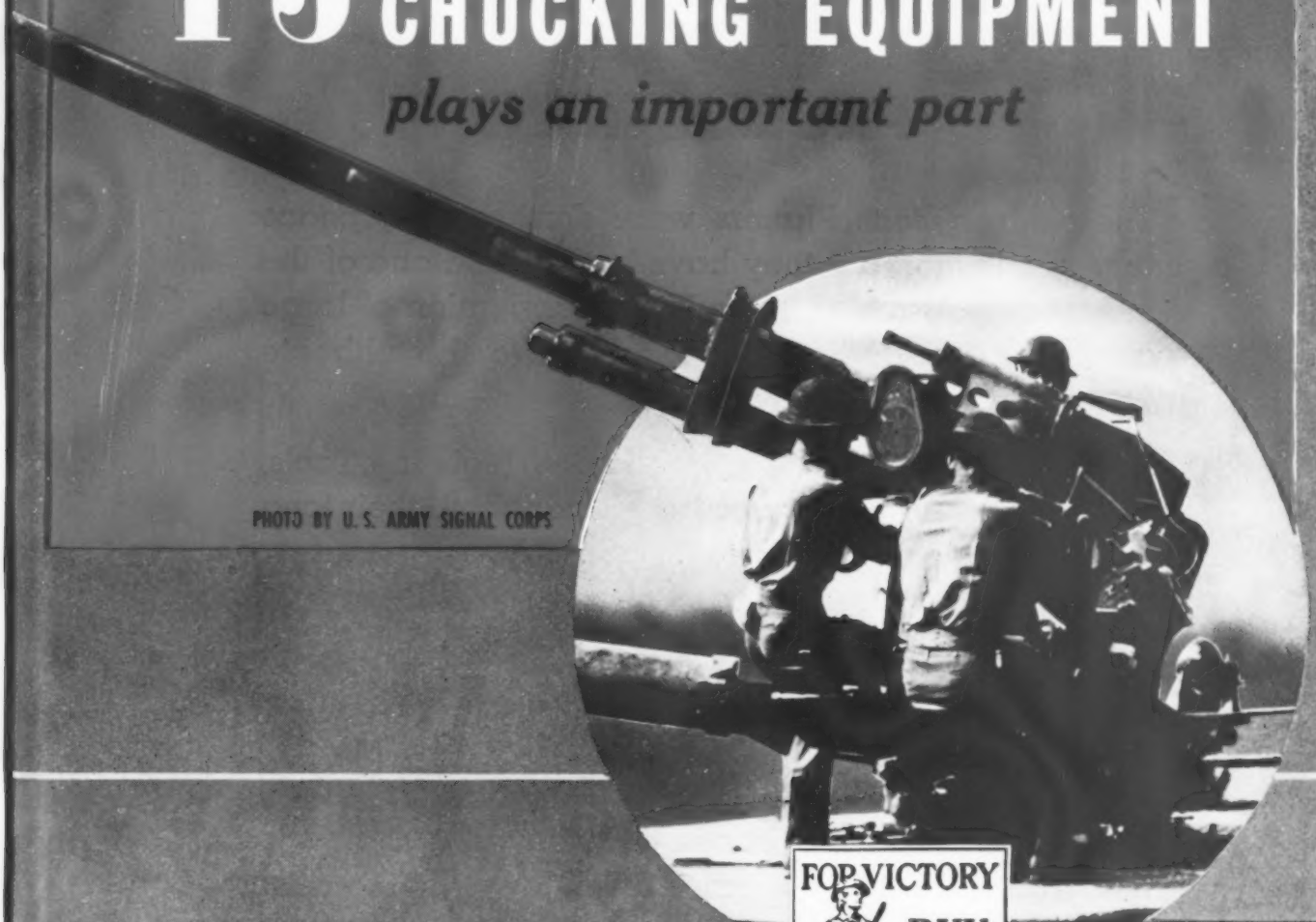


PHOTO BY U. S. ARMY SIGNAL CORPS

The machine tool industry is justly proud of its contribution to the war effort. Unprecedented output of machines has been the backbone of the unprecedented output of airplanes, aircraft engines, tanks, Bofors guns, machine guns, adaptors for shells, the American made Oerlikon gun, and many other products for war use.

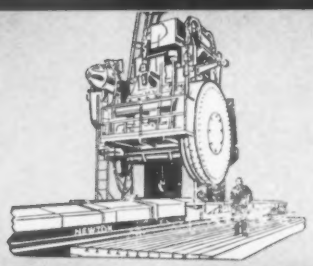
P&J machines, on the production lines of plants building these weapons, are busy turning out duplicate parts at top speed. Finish and accuracy are being maintained to highest standards so that assembly time is reduced to a minimum.

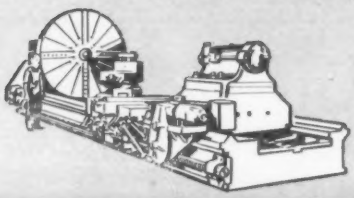
P&J offers its more than forty years experience to help step up war production to even higher levels.

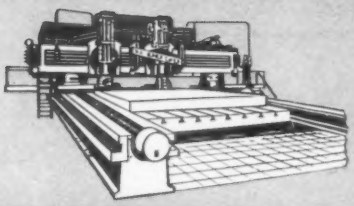
The POTTER & JOHNSTON MACHINE CO.
Pawtucket, Rhode Island

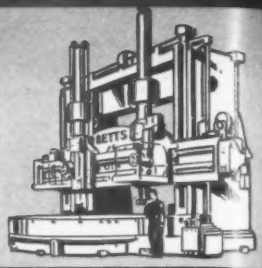
OUR BOYS WILL MARCH BACK SOONER . . . IF WE BACK THEM UP BY . . .

Buying more
WAR BONDS









INCREASE YOUR CAPACITY WITH

BETTS PLANERS

FOR RAPID, ACCURATE PRODUCTION

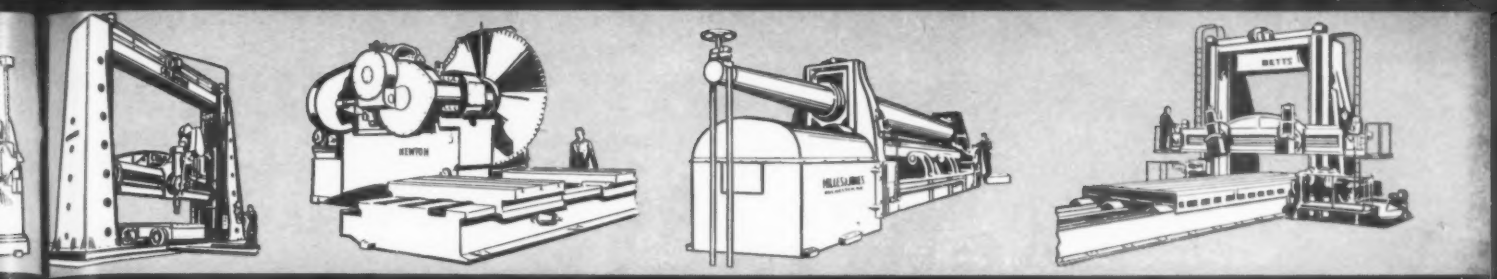
These large Betts Planers were designed for peace time production but they have been found one of the most useful Machine Tools in the fabrication of large guns, ships and tanks, so essential to the ultimate victory of the United Nations.

Betts Planers, like all Consolidated Machine Tools, are built to retain their accuracy throughout their long life. All the modern features for convenience and safety of operation have been incorporated in their design.

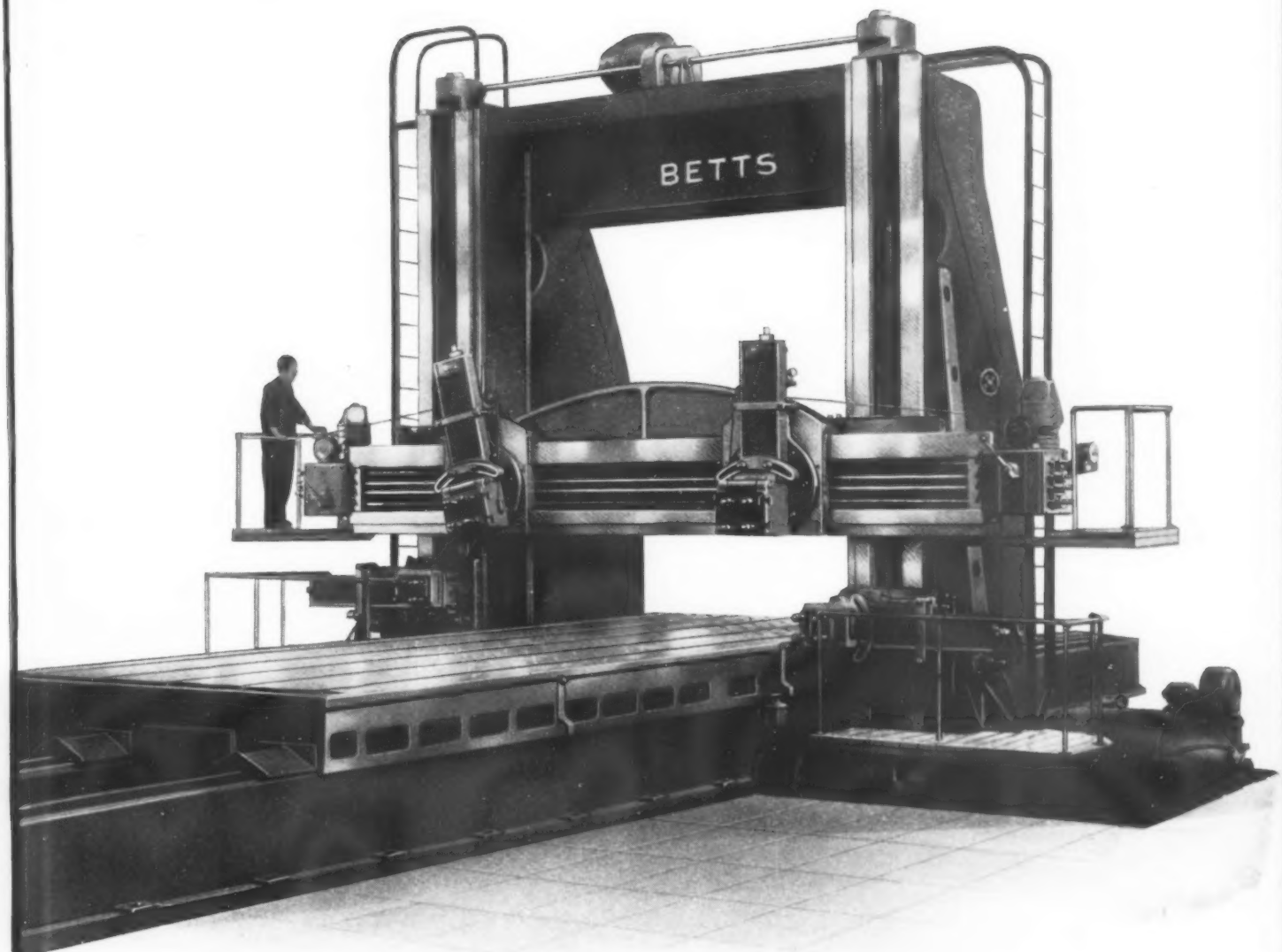
There are three ways on large Betts Planers, to evenly distribute the weight when machining exceptionally heavy work. The machines are equipped with Variable Voltage Planer Drive and automatic electrical tool lifters. All functions of the Planer including feed and rapid traverse, raising and lowering crossrail and locking it in position, are operated and controlled electrically.

If large metal parts are handled in your shop, perhaps a Betts Planer, or some of the other Consolidated Machine Tools, could be used to advantage.

Complete information will be sent on request.



H:ONSOLIDATED MACHINE TOOLS



BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

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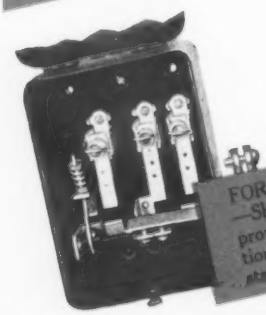
MACHINE TOOL CORPORATION
ROCHESTER, NEW YORK

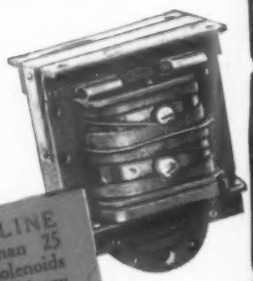
Before You Order "SPECIALS"

CHECK THESE STANDARD G-E MOTOR CONTROLS



FOR REMOTE CONTROL—Shipper-rod pilot controls to provide undervoltage protection when used with magnetic starters.

FOR LIMITING CONTROL—Standard limit switches for automatic control of lathes, boring machines, etc.

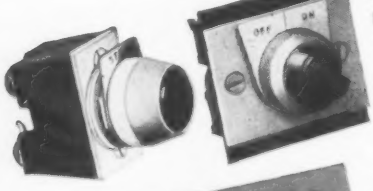


FOR STRAIGHT-LINE CONTROL—More than 25 standard a-c and d-c solenoids for almost any machinery application.

FOR QUICK-STOP CONTROL—Standard plugging switch saves time on machines that must be started and stopped frequently.

FOR PILOT CONTROL—Standard pilot control switches to mount directly on the magnetic machine-controller.

FOR CENTRALIZED CONTROL—Standard push buttons to provide centralized control for multiple-operation machines.



FOR ON-THE-SPOT CONTROL—Standard, oil-proof push-button units for mounting directly on the machine.

By combining standard controls to perform special machinery control functions—you realize all the advantages of specials without any of their disadvantages. Many of your design problems are simplified because our engineers will assume full responsibility for the selecting and assembling of standard controls to provide just the kind of special control operation that you require. Then too, standard controls—unlike many specials—have been tested for reliable operation under the severest conditions. And what is even more important today, the use of standards conserves critical materials.

More than a thousand standard G-E control accessories—only a few of which are shown on this page—make it possible to combine standard controls to meet almost any special problem.

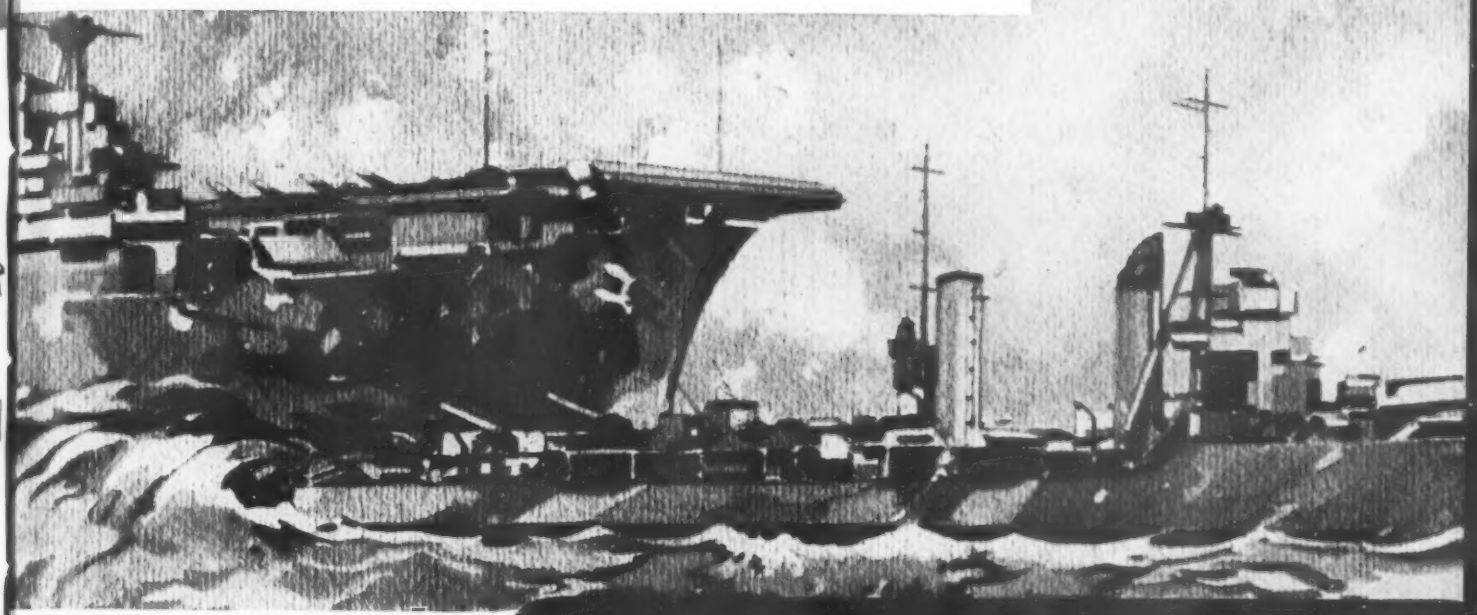
Before you say "special," see your local G-E sales engineer to be sure that you are making fullest use of the wide variety of standard G-E machinery controls. *General Electric, Schenectady, N. Y.*

GENERAL ELECTRIC

676-90-8490

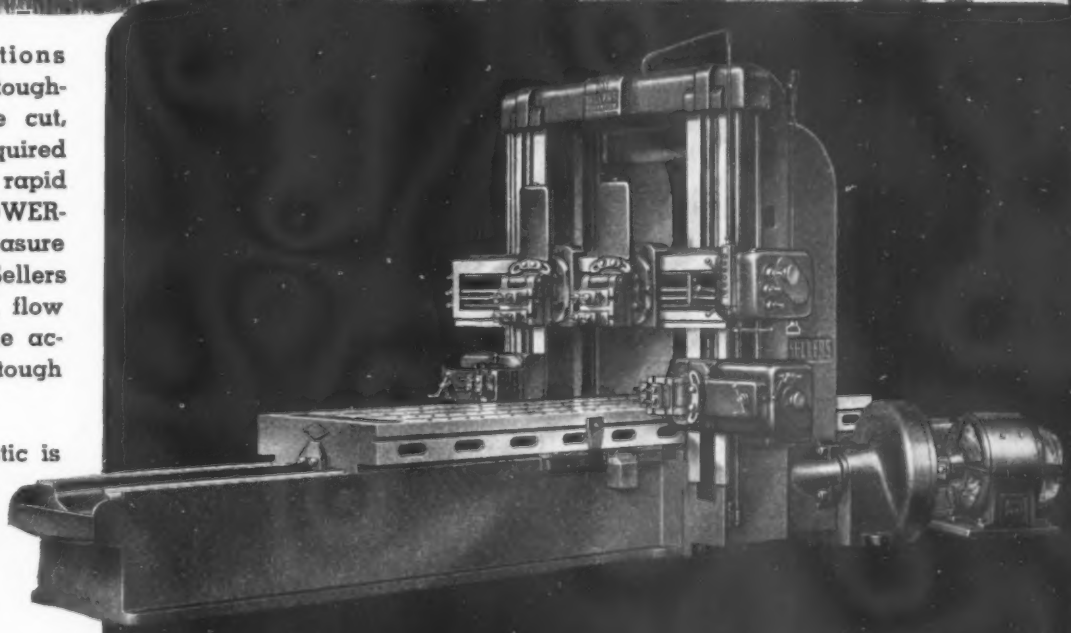
THE SELLERS POWER-FLOW PLANER FOR

Continuous, Top-Speed Production---



WHEREVER unusual conditions arise in production where tougher-than ordinary steel is to be cut, where extreme accuracy is required and where production must be rapid and continuous, the Sellers POWER-FLOW Planer will give full measure every time. Due to its time-tested Sellers principles of design, the smooth flow of power combined with extreme accuracy is assured, no matter how tough the working conditions.

The chief Power-Flow characteristic is the result of the Sellers Spiral Gear Drive, producing a smooth, non-vibrant, never varying flow of power which can be depended on for the life of the machine.

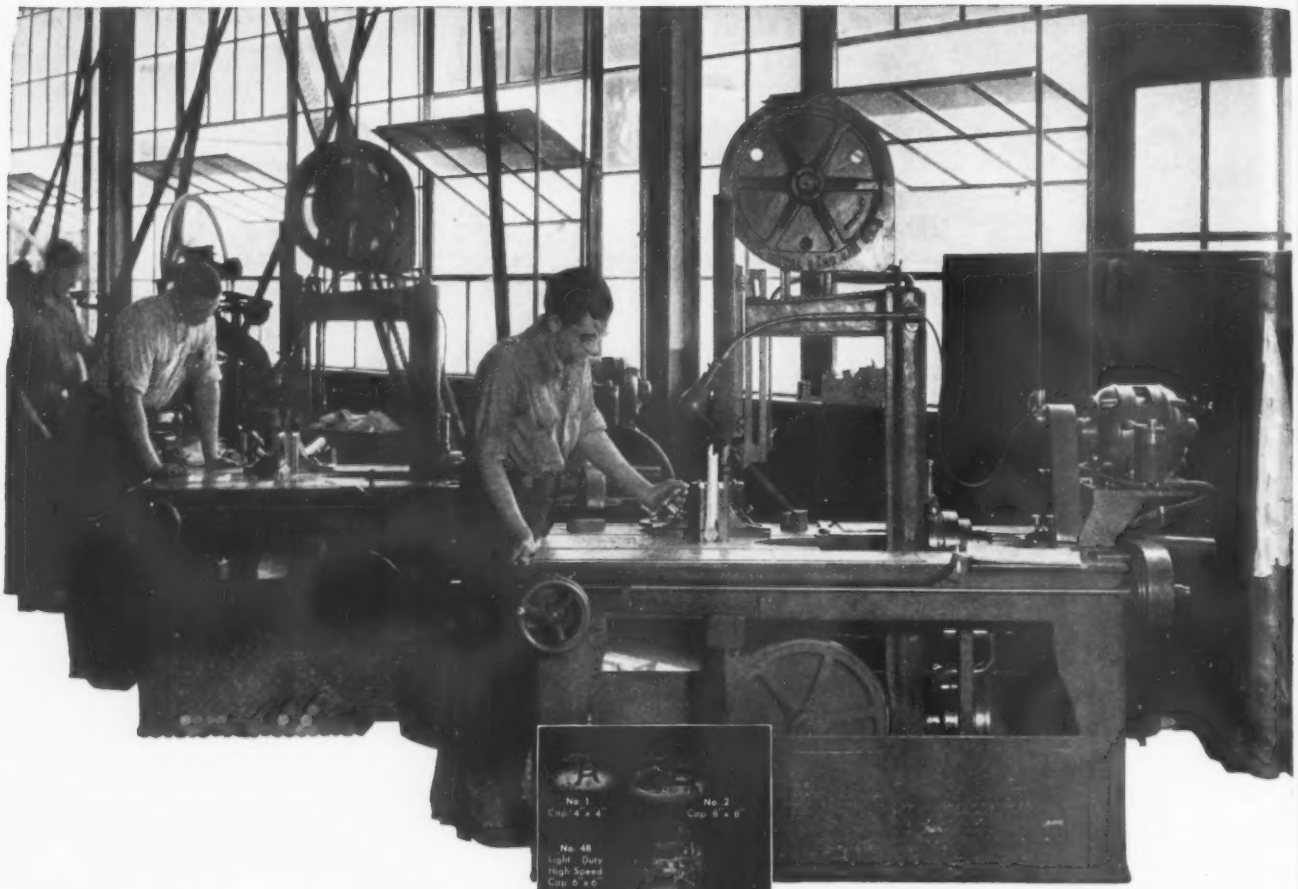


SELLERS POWER FLOW PLANER

WILLIAM SELLERS & CO.
INCORPORATED
PHILADELPHIA PENNSYLVANIA

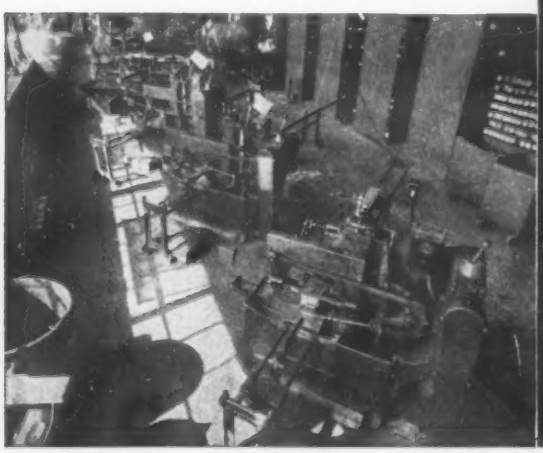
Sellers

ARMY E NAVY
FOUNDED SELLERS 1848



Tool Makers know it takes good tools to make good tools

In almost every leading tool manufacturing plant, as in the Chicago plant illustrated here, they have standardized on MARVEL Metal Sawing Equipment. (Above: MARVEL No. 8 Metal Cutting Band Saws. Below, a battery of MARVEL No. 6A High Speed Production Saws.)



A COMPLETE SYSTEM OF METAL SAWING

The MARVEL System of Metal Sawing provides exactly suited saws for every shop or department. Included in the System are: Low priced dry-cutting general purpose shop saws; a light duty high speed shop saw; heavy duty, all-ball-bearing speed saws (the fastest saws built); heavy duty production saws with automatic bar push-up; versatile all-purpose metal cutting band saws of large capacity; a new giant hydraulic hack saw designed for the largest sizes and toughest alloys . . . and the positively unbreakable MARVEL High-Speed-Edge Hack Saw Blades.

ARMSTRONG - BLUM MFG. CO.

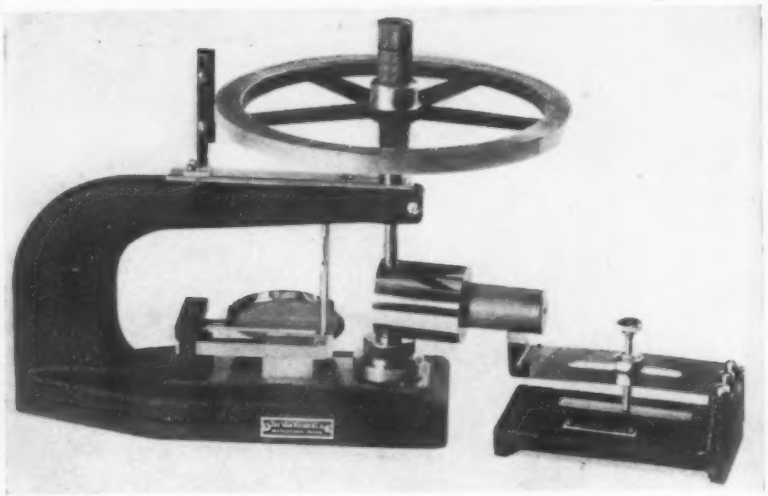
"The Hack Saw People"

5700 Bloomingdale Ave. Chicago, U.S.A.

Eastern Sales: 225 Lafayette St., New York City

MARVEL SAWS

HOW to measure to $\frac{1}{100,000}$ of an inch rapidly and accurately with Van Keuren LIGHTWAVE MICROMETER



Measuring 1¼" plug gage with the 0-2" light wave micrometer. Note balancing stand.

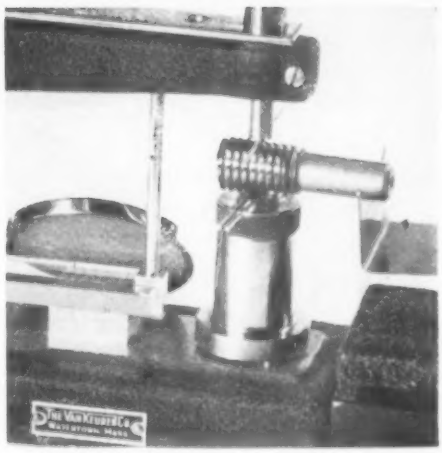
The Van Keuren light wave micrometer is a complete measuring unit which combines the accuracy of light waves with the speed and utility of the micrometer.

Measurements accurate to .00001" are made as follows:

1. **Make a zero reading at the desired pressure. This may be 6 oz., 1 lb., 2½ lbs., or any intermediate pressure. Light wave bands are moved up to a reference line and so control the pressure that readings are easily duplicated to .00001."**
2. **Insert the piece to be measured and make the measurement with the same movement of light wave bands as used in taking the zero reading.**
3. **Read the micrometer in the same manner as an ordinary micrometer;—noting the number of turns (units of .025"), the number of additional thousandths, ten thousandths and hundred thousandths. The micrometer is graduated in ten thousandths, and hundred thousandths are read as tenths of a graduation.**
4. **If any screw error is indicated on the calibration chart apply the correction to the micrometer reading to get the absolute size. The result is a reliable value to .00001".**

The light wave micrometer is not a comparator and no gage block combinations are required. It is a great time saver when measuring miscellaneous sizes and will eliminate rejections that might be caused by worn gage blocks.

The light wave micrometer is recommended for checking gages and precision parts. It is suitable for measuring paper, leather, rubber, textiles, hairsprings, fine copper wire, and soft materials.



The light wave micrometer is ideal for measuring thread gages and ground taps by the 3 wire method. It also provides an excellent means for calibrating measuring wires and shop standards.

Send for CATALOG giving complete details . .

"ULTIMATE ACCURACY"

THE Van Keuren COMPANY 176 WALTHAM ST., WATERTOWN, MASS.

Light Wave Equipment · Light Wave Micrometers · Gage Blocks · Taper Insert Plug Gages · Wire Type Plug Gages · Measuring Wires · Thread Measuring Wires · Gear Measuring System · Shop Triangles

Gauges check the accuracy of Mazlo Magnesium castings from every angle

This man is looking for trouble. The odds are greatly against his finding it, because that casting was made in an American Magnesium foundry. The patterns had been proved correct on test runs before the job was placed in production. The cores were inspected and then checked for position before the mold was closed.

This saves time at the customer's plant. Parts go into machining fixtures without further checking or fitting of jig points. The attention this casting is receiving is no exception. That's why Mazlo Magnesium Products are favored by so many manufacturers.

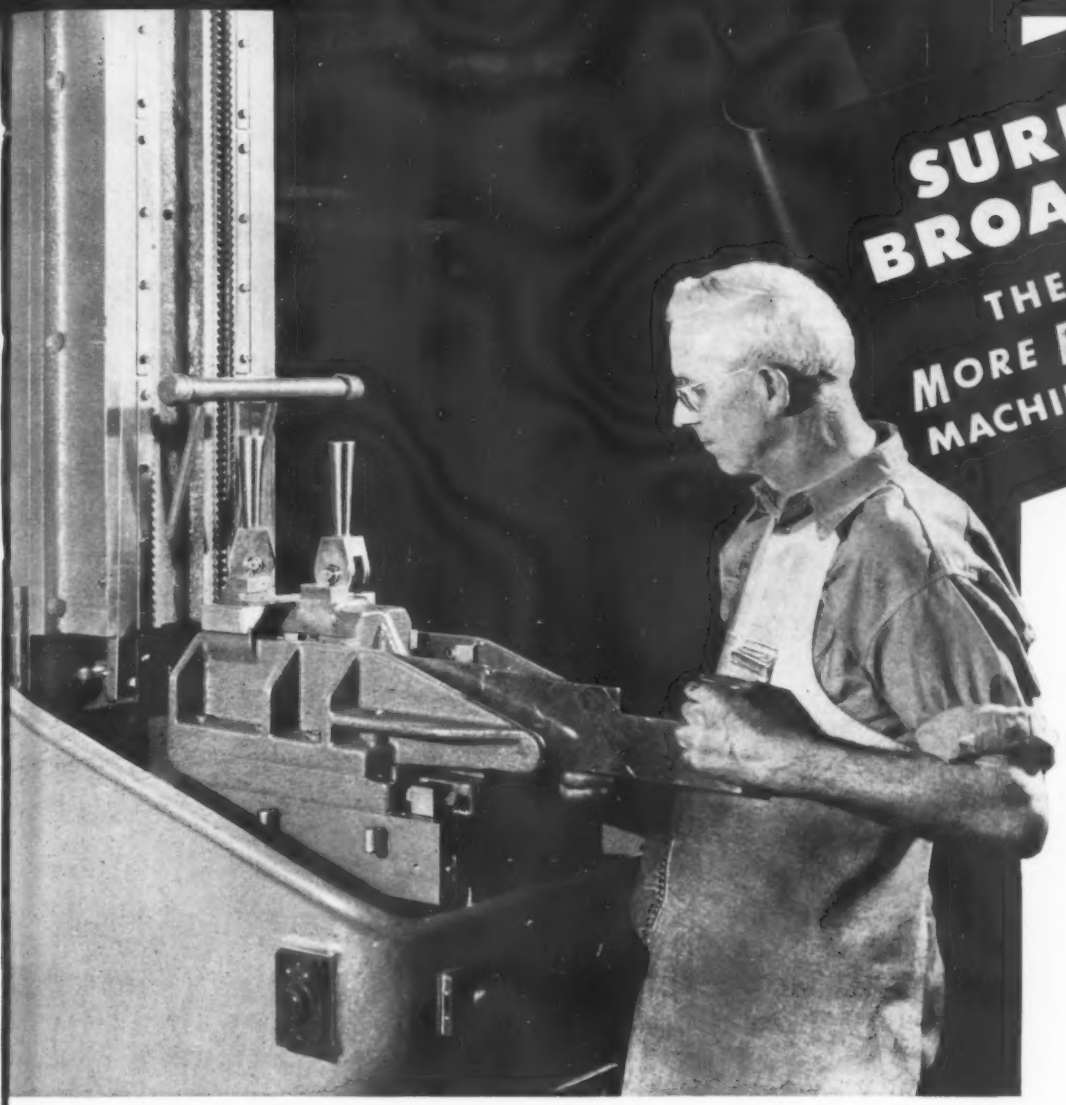
Backing up these inspectors in their drive for quality products are workmen who know what it takes to meet these high standards. For over twenty years, American Magnesium Corporation has been working solely with Magnesium Alloys, producing castings, forgings, shapes and sheet. Manufacturing techniques have been improved constantly.

Today, this skill and care are being applied to war production. Tomorrow, these services will be available to you. It is not too early to be thinking how you can use Mazlo Magnesium Products to best advantage. Sales Agent: Aluminum Company of America, 1709 Gulf Building, Pittsburgh, Pennsylvania.

MAGNESIUM MAZLO PRODUCTS

AMERICAN MAGNESIUM CORPORATION

SUBSIDIARY OF ALUMINUM COMPANY OF AMERICA



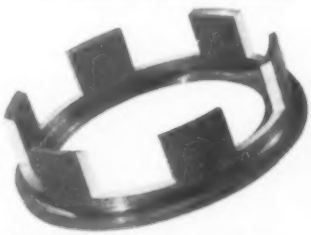
SURFACE BROACHING

THE FASTER, MORE ECONOMICAL, MACHINING METHOD

Cast iron—two parallel surfaces machined in one operation

Deep slotting with finish across top

Hexagon screw machined in one pass with indexing fixture



Slots machined with indexing fixture

★ Footburt surface broaching may be the answer to your problem of faster machining on war contracts. Many jobs that were slow and expensive when handled by conventional machining methods are now being produced by surface broaching. Production in most cases is as fast as the speed at which parts can be loaded, yet cutting speeds are so low that the cost of tool maintenance shows great savings. Exceptional finish can be maintained. We will gladly discuss your machining problems with you.

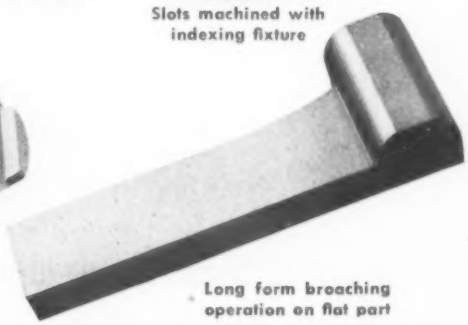
THE FOOTE-BURT COMPANY, Cleveland, Ohio

Detroit Office: General Motors Building

Tongues broached on ends of part in one operation

Intricate form broach on plier jaw

Two cuts at right angles with indexing fixture



Long form broaching operation on flat part

FOOTBURT *Surface* BROACHING

A NEW TYPE MACHINE

DEVLIEG JIGMIL

No. 3-A
3" BAR

To more accurately and speedily serve the broad field needing a machine having

• • •

THE SPACING ACCURACY
OF A JIG BORER

• • •

THE PERFORMANCE QUALITIES
OF A MILLING MACHINE

• • •

THE CONVENIENCE AND
FLEXIBILITY OF A
HORIZONTAL BORING MILL

☆ A PRECISION MACHINE ☆

Featuring

NEW SPEED OF OPERATION

NEW ADVANCED FINGER TIP CONTROLS

NEW STANDARDS OF EXCELLENCE OF BORED HOLES

NEW ACCURACY IN MILLING

AUTOMATIC TABLE RETRACTION AND REPOSITIONING

Many machines in operation show 75% greater average daily productivity and improved dependability for precision.

Write for Circular

DEVLIEG MACHINE COMPANY
450 FAIR AVENUE, FERNDALE (DETROIT), MICHIGAN

DEVLIEG
MACHINE
TOOLS

MUTINY

—ON THE HIGH SPEEDS!

It takes only *one* trouble-maker to start parts fighting among themselves! Any high speed rotating part which, lacking proper balance, throws undue strain on other parts. The result is mechanical mutiny—symptomized by vibration, noise, bearing overloads and excessive wear.

The locating and measuring of unbalance with Gisholt Dynetrics is now reduced to a few simple readings—and averages but a few seconds per part. Many vital war products are made better—more dependable—because of it.

GISHOLT MACHINE COMPANY
1201 E. Washington Ave.
Madison, Wis.

GISHOLT DYNETRIC BALANCING MACHINES
use the radio means of amplification to detect vibrations due to unbalance as small as .000025". Literature on Gisholt Dynetric Balancing Machines will be sent on request.

The Army-Navy "E" and the Treasury Flag fly side by side at Gisholt

GISHOLT

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

The familiar Miracle

Look twice. You think you see a negative of two soldiers clashing in bayonet practice. Actually you are looking at sunlight and silver bromide.

The mysterious action of light on certain silver salts is just as much a miracle today as it was a hundred years ago when the first photographs were made.

Hardly less amazing is the remarkable sensitivity of present-day photographic emulsions.

These new films and papers could not be manufactured without exacting control of temperature, control of humidity and protection against dust. *Air conditioning* makes them possible.

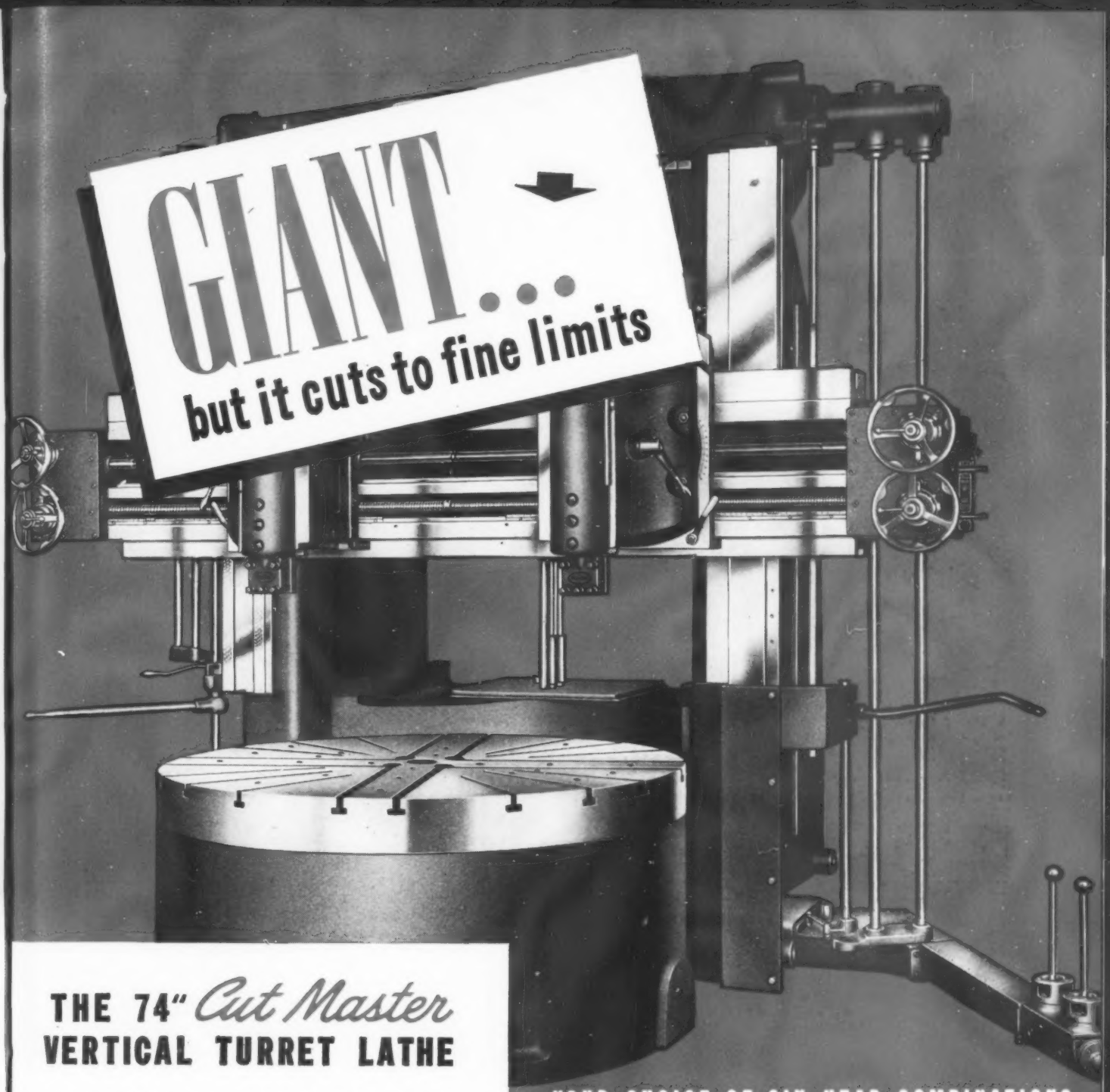
Air conditioning and refrigeration play a part in many photographic processes. They are being used to speed up military photography . . . improve all photography.

Today, air conditioning equipment . . . developed by General Electric . . . has been made more compact, more flexible to meet unusual wartime requirements.

After the war, these improvements will result in better air conditioning for offices, stores, theatres, hotels and many other civilian purposes. When the war is won, General Electric will provide this better air conditioning—for a better world.

Air Conditioning and Commercial Refrigeration Department, Division 432, General Electric Co., Bloomfield, New Jersey.

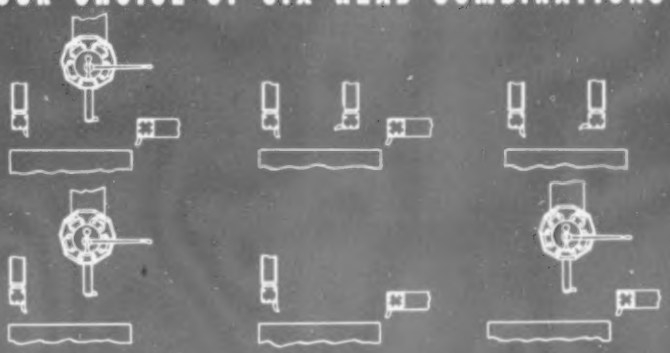
Air Conditioning by GENERAL ELECTRIC



THE 74" *Cut Master* VERTICAL TURRET LATHE

Now available for certain plants doing war work is the 74" Cut Master V.T.L. You can handle your biggest jobs on this versatile tool — yet lose none of the accuracy for which all V.T.L.s are famous. Three heads — the swiveling turret head, swiveling ram head, and side head — may be ordered in any one of six combinations. Rapid power traverse of all heads in any direction cuts lost time between cuts. In addition there are 20 speeds in low range up to 60 R.P.M.; in high range up to 120 R.P.M., and 16 feeds in geometric ratio from .0026 to .500. Telegraph your inquiries with contract and priority data.

YOUR CHOICE OF SIX HEAD COMBINATIONS

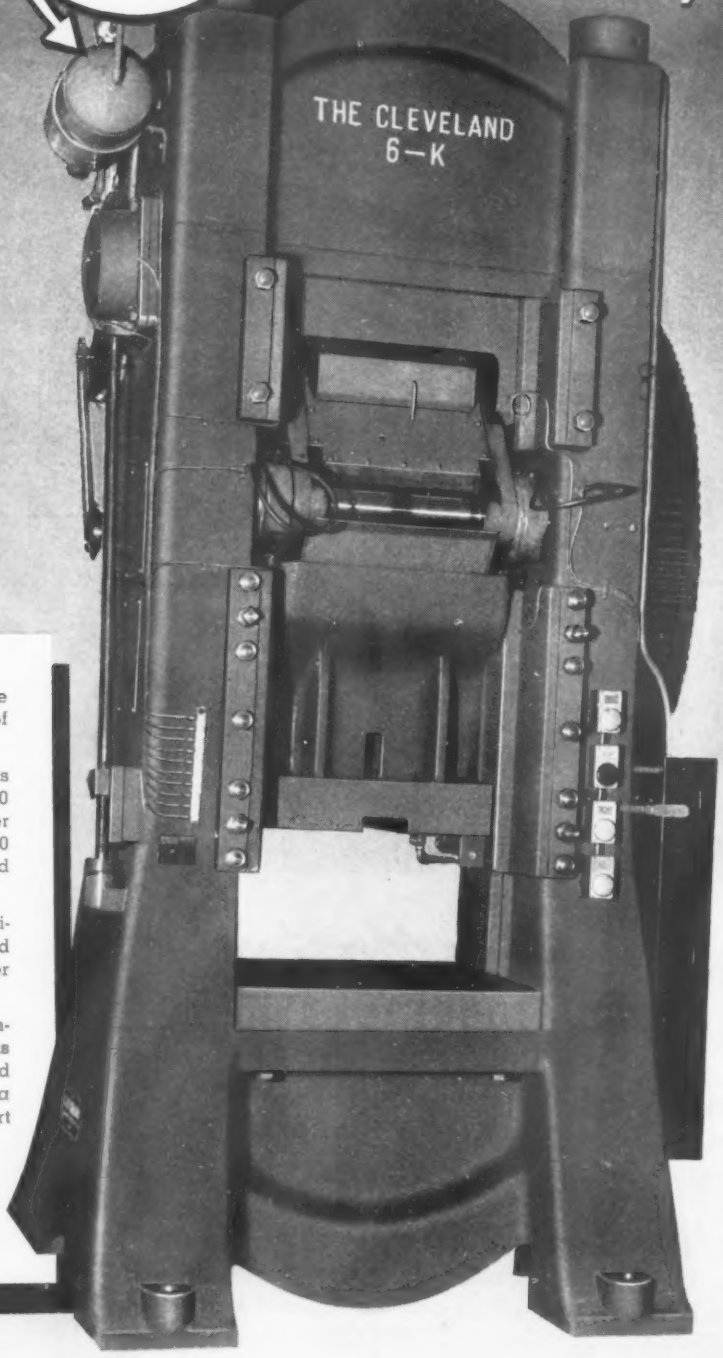


THE BULLARD COMPANY
BRIDGEPORT CONNECTICUT

75·100·150·200·400·[illegible]

600 Tons Capacity

700·800·1000·1200·2000



This 600 ton Cleveland Knuckle Joint Press is one of the intermediate sizes of this particular type of Press.

The smallest standard Cleveland Knuckle Joint has a capacity of 75 tons, while the largest rates 2000 tons. Between these two, there are nine other standard sizes: 100 tons, 150 tons, 250 tons, 400 tons, 600 tons, 800 tons, 1000 tons, 1200 tons and 1500 tons.

The 6 K illustrated is equipped with an electrically controlled air operated friction clutch and brake, and operates at a speed of 20 strokes per minute.

While this type of Press is now being used extensively in the production of steel shell cases, its usefulness is not confined to this particular kind of work as it can be used advantageously for a large variety of products which require a short but extremely powerful squeeze on the metal.

The Cleveland line of Power Presses embraces 13 different types, each having its own particular advantages for a given type of work.

Modern Presses THE CLEVELAND PUNCH & SHEAR WORKS COMPANY *Cleveland, Ohio*

NEW YORK • CHICAGO • DETROIT • PHILADELPHIA • PITTSBURGH

RIVETT

715 PLAIN BENCH LATHE

Power and Speed Range Are Combined with Precision for Greater Earning Capacity

The Rivett No. 715 Bench Lathe fulfills two distinct functions: the production of small duplicate parts requiring extreme accuracy, and the finishing and fitting of fine elements in assembly, maintenance, tool room and laboratory. Various attachments extend its usefulness, and each employs the inherent truth of the preloaded ball bearing spindle. The attachments include, besides compound slide rest and tailstocks, universal grinding attachment and milling attachment. The unit motor drive provides eight selective spindle speeds and may be used with either steel cabinet or bench mounting.

The original accuracy built into Rivett No. 715 is protected for years of normal use. The enclosed headstock provides rigid, vibrationless mounting for the super-precision ball bearings. All revolving parts are dynamically balanced. The self-centering design of the long taper key-drive spindle nose guarantees true running chucks and face plates. Steel top slide and full depth Acme feed screws make for an enduring compound slide rest. All vee belts are replaceable without disturbing lathe or drive assembly or removing spindle from its bearings.

Replaceable Spindle Belts

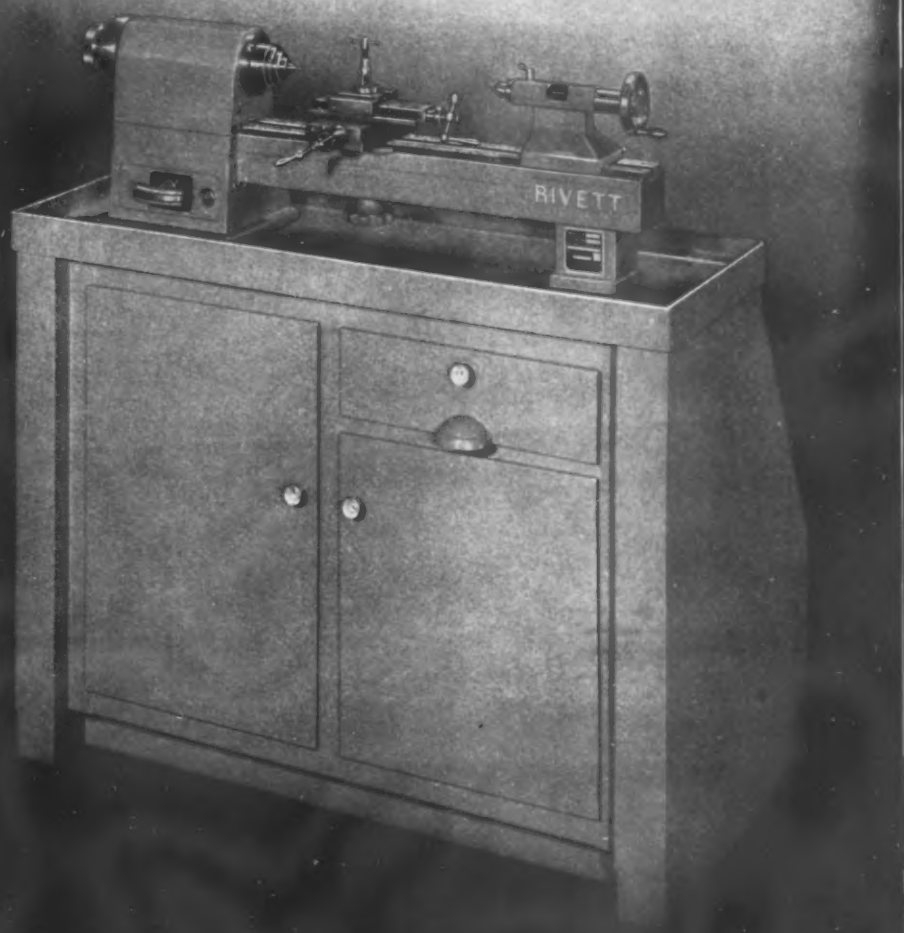
Long Taper Key-Drive Nose

Convenient Drive Control

SPECIFICATIONS

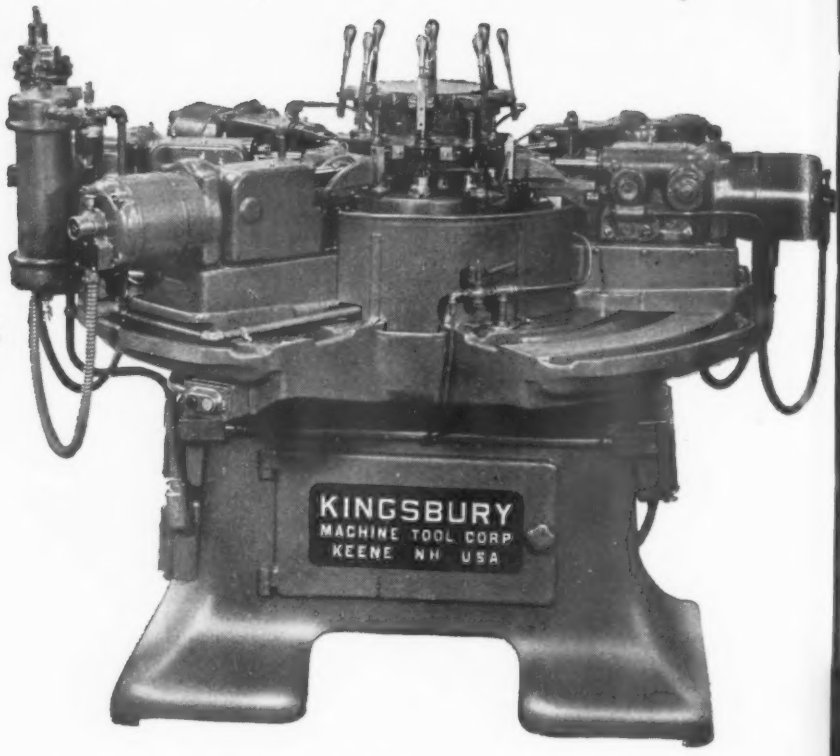
Swing over bed, dia.	7"
Distance between centers	15"
Collet capacity, max. dia.	¾"
Step chuck capacity, max. dia.	5"
Jaw chuck capacity, max. dia.	4"
Spindle capacity, max. dia.	55/64"
Slide rest, travel of tool post slide	4¼"
Slide rest, travel of cross slide	5"
Tailstock spindle travel	3"
Spindle speeds:	
Eight forward and reverse	150 to 3500 r.p.m.
Weight of lathe, mounting and drive, net	650 lbs.

For Further Description Write for Bulletin 715

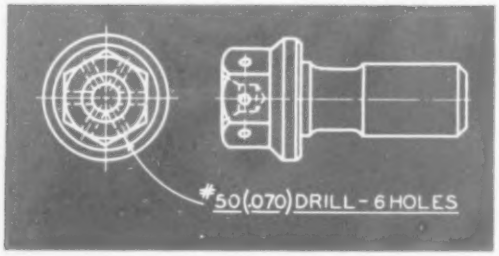


RIVETT LATHE & GRINDER INC.
BRIGHTON BOSTON MASS.

Loading and Unloading While Drilling assures Continuous High Production



FLEXIMATIC



by KINGSBURY

THIS IS A FLEXIMATIC AIRPLANE JOB!

Kingsbury Standard Units for drilling, reaming, boring, spotfacing and milling can be mounted in any combination, operated automatically and changed over quickly and easily to suit the requirements of the work to be handled.

This six-spindle **FLEXIMATIC** is set up for drilling lacing holes in the heads of screws for airplane motors. High production, so essential to parts involved in the speeded up program of this important phase of National Defense, is being achieved with minimum effort on the part of the operator.

The main turret of this **FLEXIMATIC** contains eight individual turrets which index 60° at each index of the main turret. Each of the six automatic drilling units on the machine drill a hole from the outside face of the hex head into the center only. The operator merely loads and unloads at the loading station while the holes are being drilled at the other stations on the machine. All six drilling operations are performed in a single chucking of the work.

Speed, convenient handling, accuracy and continuous production are universally recognized advantages offered by **FLEXIMATICS** regardless of the nature of the job assigned them to handle. The specific work being performed here is typical of many others where **FLEXIMATICS** are the machines for jobs calling for the maximum in time savings.

KINGSBURY MACHINE TOOL CORPORATION
KEENE NEW HAMPSHIRE U.S.A.

UNION
TOOL ECONOMY IS IMPORTANT TODAY
Present conditions make it vitally important that maximum service be obtained from every small tool. One of the first steps toward tool economy is to choose tools that are known for their ruggedness and longer lasting accuracy.
Choose UNION Tools—treat them well—and you will see the results of your economy in the longer accurate service and uninterrupted production you get from every tool bearing the UNION name.
Union Butterfield Card
Divisions of the UNION TWIST DRILL CO.
UNION TWIST DRILL CO.
ATHOL, MASS.
S. W. Card Mfg. Co. Div., Mansfield, Mass.
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New York: 61 Reade St.
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CARD

Get better tapping results on war production jobs! Have the Card organization show you how to get the last ounce of value from every tap you use. We can give you reliable information on every phase of thread production—preliminary drilling and reaming, correct lubrication, correct tap grinding . . . You get more than a supply of tools when you order Card Taps. You get Service that means longer tap life, better machine performance and greater efficiency.

The CARD Quality

Divisions of the UNION TWIST DRILL CO.

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S. W. CARD MFG. CO.
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Butterfield
Reamers that are **right**—for jobs that demand the utmost in precision . . . for trouble-free, tool-saving performance under heavy high production demands . . . for results that satisfy in every material, all types of work.
Choose Butterfields, and let this one great name be your guide to the right tool for every reaming job.
BUTTERFIELD DIVISION
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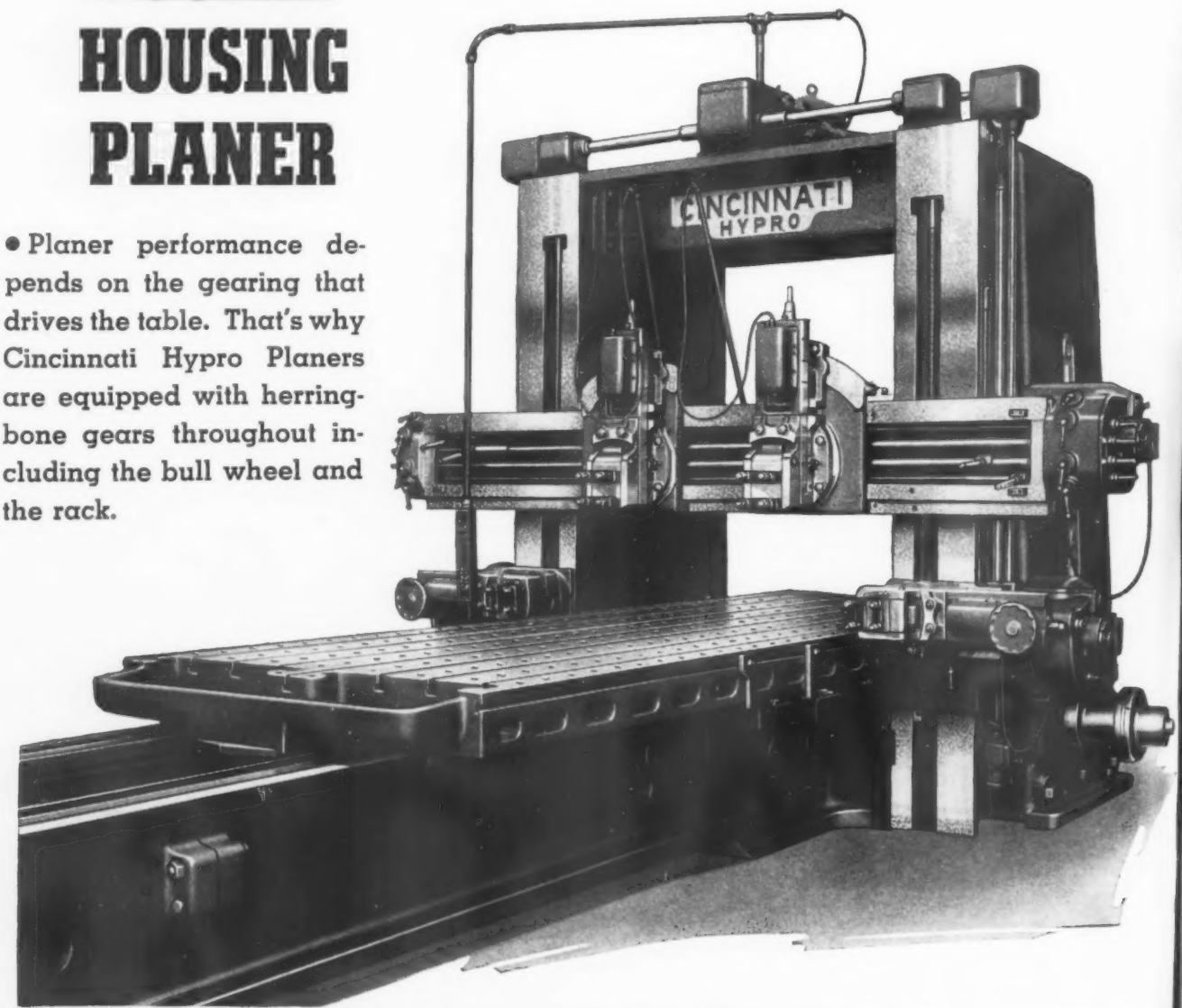
CINCINNATI Hypro

84" x 72" DOUBLE HOUSING PLANER

• Planer performance depends on the gearing that drives the table. That's why Cincinnati Hypro Planers are equipped with herringbone gears throughout including the bull wheel and the rack.

• The greater tooth surface provided by herringbone gears offers a balanced drive free from any loss of power. There are no side thrusts. The all steel gears on this planer are constantly lubricated and withstand heavy cutting indefinitely.



THE CINCINNATI PLANER COMPANY
Planers Vertical Boring Mills Planer Type Millers
CINCINNATI . OHIO . U.S.A.

Shapes OF THINGS TO COME

The shapes of tomorrow's products will differ from those of today. Materials will be different, too—new alloys and new plastics already point the way. Whatever those shapes, whatever the materials, Clearing Presses will be doing the job of giving form to the necessities and the luxuries to come because Clearing Presses will be built to do whatever the jobs of the future may demand.

Tradition has not limited Clearing designers up to now. Experience has proved what daring minds and determined hands can achieve, and Clearing will continue the leadership it has earned.

Shapes for things to come will mean new production problems. Cost will be a strong factor, with ever-closer tolerances the rule. Clearing performance today, and Clearing's record of past developments, is your assurance of able assistance in the future from the Clearing organization. Remember when they say it's an impossible job for a press: "Ask Clearing."

CLEARING MACHINE CORPORATION
6499 W. 65th St., Chicago, Illinois

Collier's for September 26, 1942

KEEP 'EM FLYING!

Triple-threat

One of the best ways to put the squeeze on the Axis is to produce better airplanes, faster.

This giant, triple-action press—using hydraulic, pneumatic and hydromatic pressure—is dedicated to that purpose.

Built to the specifications of Boeing engineers, this press and a twin at Boeing's Midwest plant are the only ones of their kind in the aircraft industry. They are monsters that form steel, duralumin or aluminum with equal ease.

The job of this press is to squeeze out airplane parts, to make them exactly alike, and to make them fast. Right now it is turning out fillets, angles, stiffeners, bulkhead channels and exhaust shrouds for the Flying Fortress.*

It makes some of these parts 75 times faster than the machine which it replaced.

This is one of the many reasons why Boeing production is steadily increasing, why Boeing was selected as the first aircraft company to receive the Army Navy award for high achievement in production. (The rate of output of Flying Fortresses is now more than three times what it was on the day of Pearl Harbor.)

The pressure is on at Boeing, day and night. This heavy press, by no means the most powerful of the Boeing presses, is a symbol of speed and efficiency in airplane production. It is one of a team of presses, one of a team of thousands of machines, part of the unbeatable American system of combining men and machines to shape our ends.

The measure of speed and efficiency in manufacture—both for peace and for war—is only one of the many different projects that form a constant part of the Boeing engineering schedules.

BOEING

DESIGNERS OF THE FLYING FORTRESS · THE STRATOLINER · PAN AMERICAN CLIPPERS

When Boeing required press equipment they called upon Clearing engineering and production facilities. Clearing equipment now constitutes a vital part of Boeing's fabricating capacity.

CMC CLEARING

FOR SHAPES OF THINGS TO COME

CLEARING

MECHANICAL AND HYDRAULIC PRESSES

Flood casualty YESTERDAY

OK'd for Service on the Production Front Today

FLASH FLOODS "SOMEWHERE IN U.S.A." 48 TONS OF ELECTRICAL EQUIPMENT WATER-SOAKED, UNFIT FOR SERVICE. RUSHED TO WESTINGHOUSE MANUFACTURING & REPAIR PLANTS, DRIED IN ELECTRIC OVENS, RECONDITIONED, INSPECTED, TESTED...WITHIN 24 HOURS

MANY OK'd MOTORS WERE ON THE RETURN TRIP—WITHIN 10 DAYS

ALL EQUIPMENT RESTORED TO SERVICE.

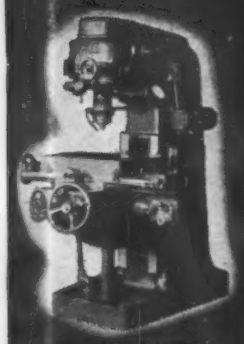
Westinghouse
MANUFACTURING AND REPAIR

J-90462

***IF* THE EQUIPMENT NEEDING REPAIR IS VITAL TO THE WAR EFFORT . . . PHONE THE NEAREST OFFICE OF WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY FOR**

EMERGENCY SERVICE

33 M & R PLANTS . . . ONE NEAR YOU!

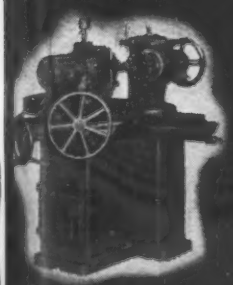


Rotary Head Milling Machine

Autometric Jig Boring Machine

Milwaukee Midgetmill

Milwaukee Speedmill



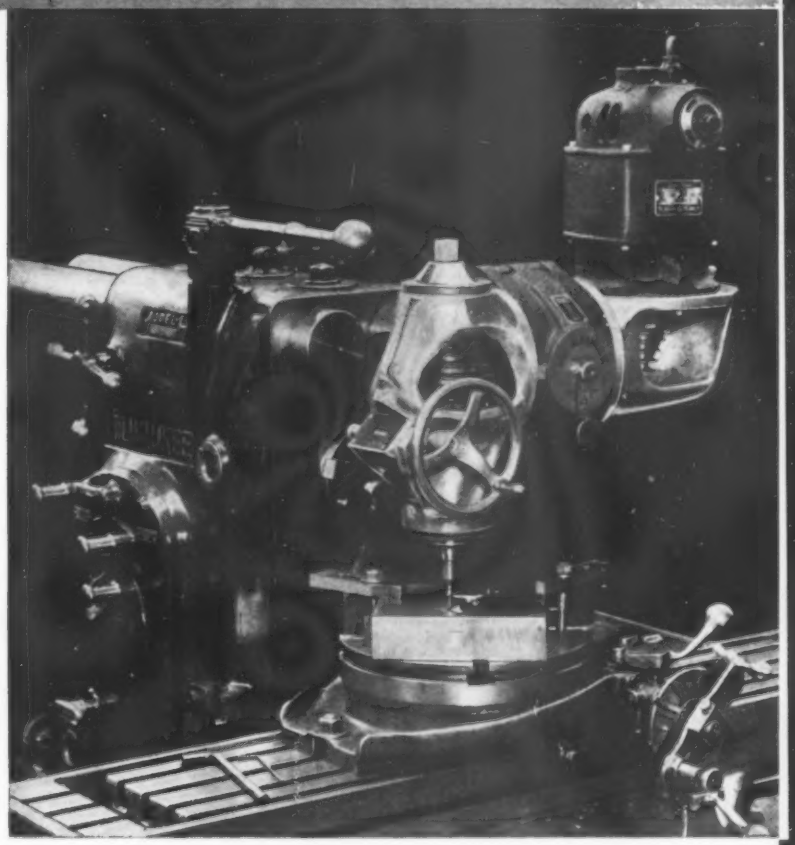
Milwaukee Face Mill Grinder

Center Scope

2 REASONS WHY MOLD AND DIE MAKERS PREFER THE MILWAUKEE MIDGET MILL

1- EXTREME SMOOTHNESS OF CUTTER OPERATION

2- MINIMUM CUTTER BREAKAGE



THE Midgetmill is designed to get the most from small tools by providing the necessary high speeds to assure accurate, trouble-free performance on the production of dies, molds, metal patterns and templets. Its unusual stability means extreme smoothness of cutter operation and a minimum of cutter breakage.

The completely universal feature, swiveling either toward or away from the column face in either direction, extends the versatility and flexibility of this attachment to hundreds of applications, including a wide variety of angular milling, drilling and horizontal boring operations.

The Midgetmill is equipped with a Thou-Meter which registers in thousandths instantaneously, eliminating costly errors. It has no graduations, dials, stops, counting turns or binding screws. One or more Midgetmills in your shop will help you to keep in step with today's demand for high speed tool and die making and other precision machining.

★ ★ ★

Write for Bulletin 662 C and information on the Milwaukee Midgetmill, the high-speed attachment adaptable to any milling machine.

KEARNEY & TRECKER PRODUCTS CORPORATION
Milwaukee, Wisconsin

Kearney & Trecker Products
CORPORATION
Subsidiary of Kearney & Trecker Corporation

The Fly in the Cathedral...

Two million atoms could lie in a line across the dot of an i — yet each alone is a complete solar system, with electrons whirling around a central nucleus like planets around the sun. And that nucleus occupies no more space in its lonely atomic universe than a fly in a cathedral.

This is the physicist's picture of the atom, source of all energy. And today, with giant cyclotrons, he is smashing the atom — hurling these tiny planetary systems at each other with the speed of shooting stars, and with miraculous results: Sodium transformed into magnesium, aluminum into phosphorus — and the atom itself into power beyond the wildest dreams of Watt or Diesel or Edison. . . . In an ordinary glass of water is the potential power of a billion kilowatt hours!

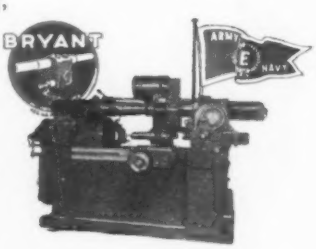
When will industry be able to harness atomic power? Possibly in six months, six years, or not for six decades, but of this you can be certain: One day, just as sure as the earth revolves about the sun, every form of power machinery in use today will be totally obsolete.

This story of atomic power is only an extreme illustration of the problems that industry faces as a result of *change*.

Today, we are living in the midst of far greater and swifter change than the average business is prepared for. As a result, many businesses — seemingly on the rise — are actually on the brink of failure in the new world of post-war production.

If your business is manufacturing with metal . . . and if you are planning ahead now . . . there is one thing that you can do to protect your business against failure to keep pace with changing methods of production: Consult with the leading *specialists* in machine tool engineering!

In the vast and highly specialized field of internal grinding, there is Bryant! Call upon us now!

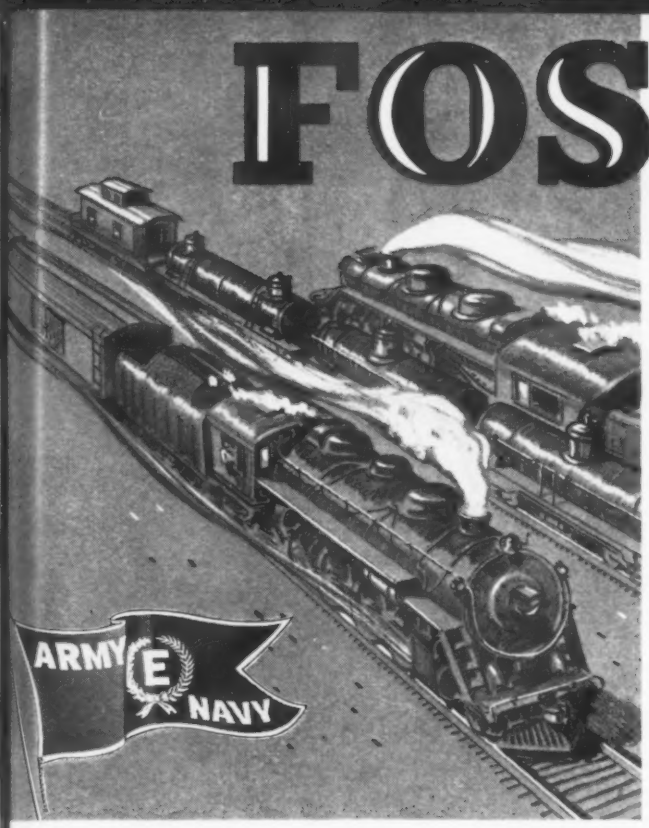


Bryant Chucking Grinder Company
SPRINGFIELD, VERMONT, U. S. A.

SEND FOR THE MAN FROM BRYANT

FOSDICK

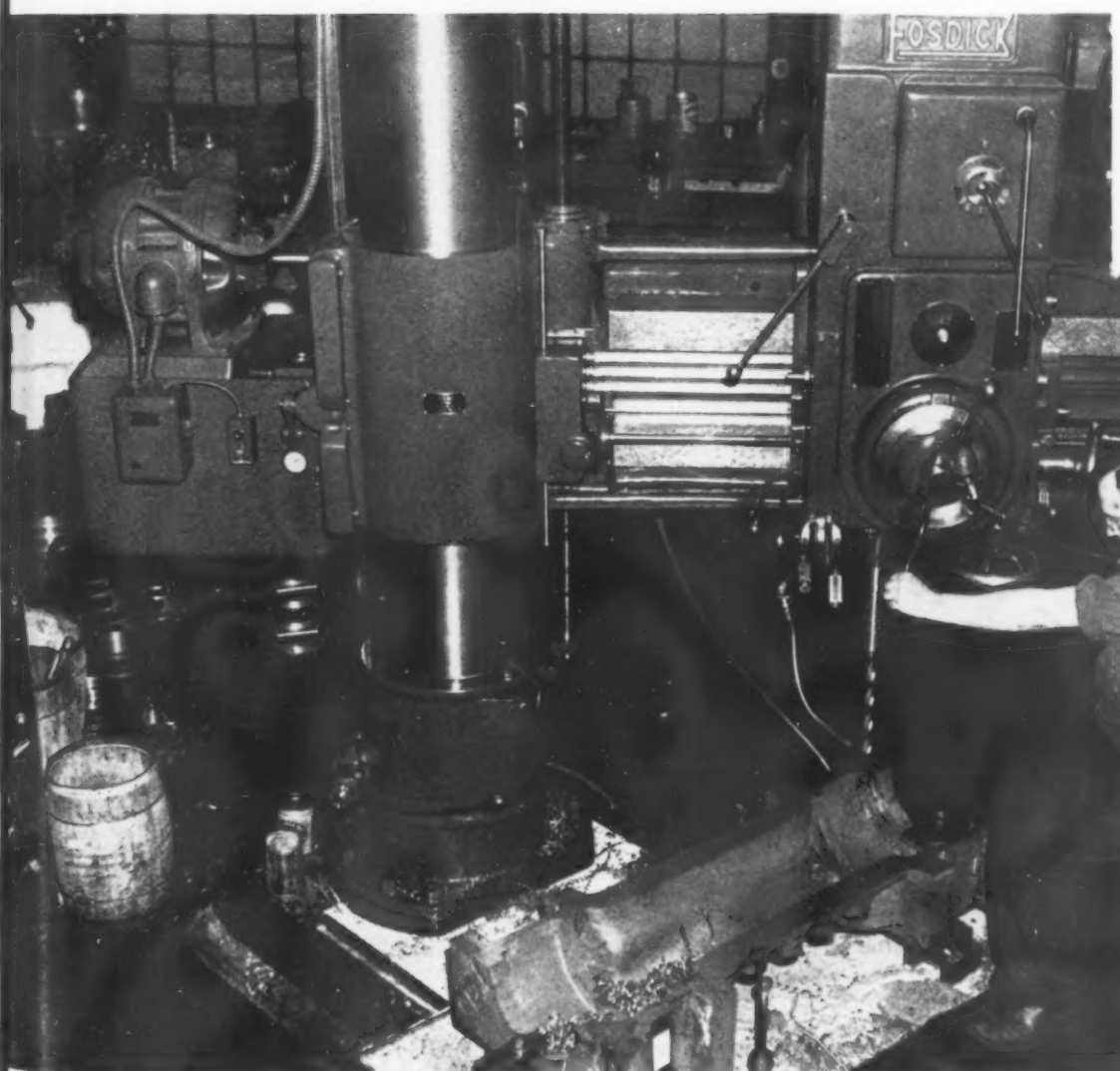
Hydraulic Radial



HELPS MAINTAIN VITAL TRANSPORTATION

War materials and equipment get the "green light" on all roads leading to our fighting fronts. Transportation by sea, air and rail must be constantly maintained.

Here a Fosdick Hydraulic Radial is drilling and reaming 16—1¼" dia. and 8—1⅝" dia. tapered holes in a locomotive axle housing. These operations in this steel casting are completed at one setting. The wide range of feeds and speeds—versatility of the machine—concentrated controls at the head, for all functions of the machine—all contribute to speeding up production and reducing costs.



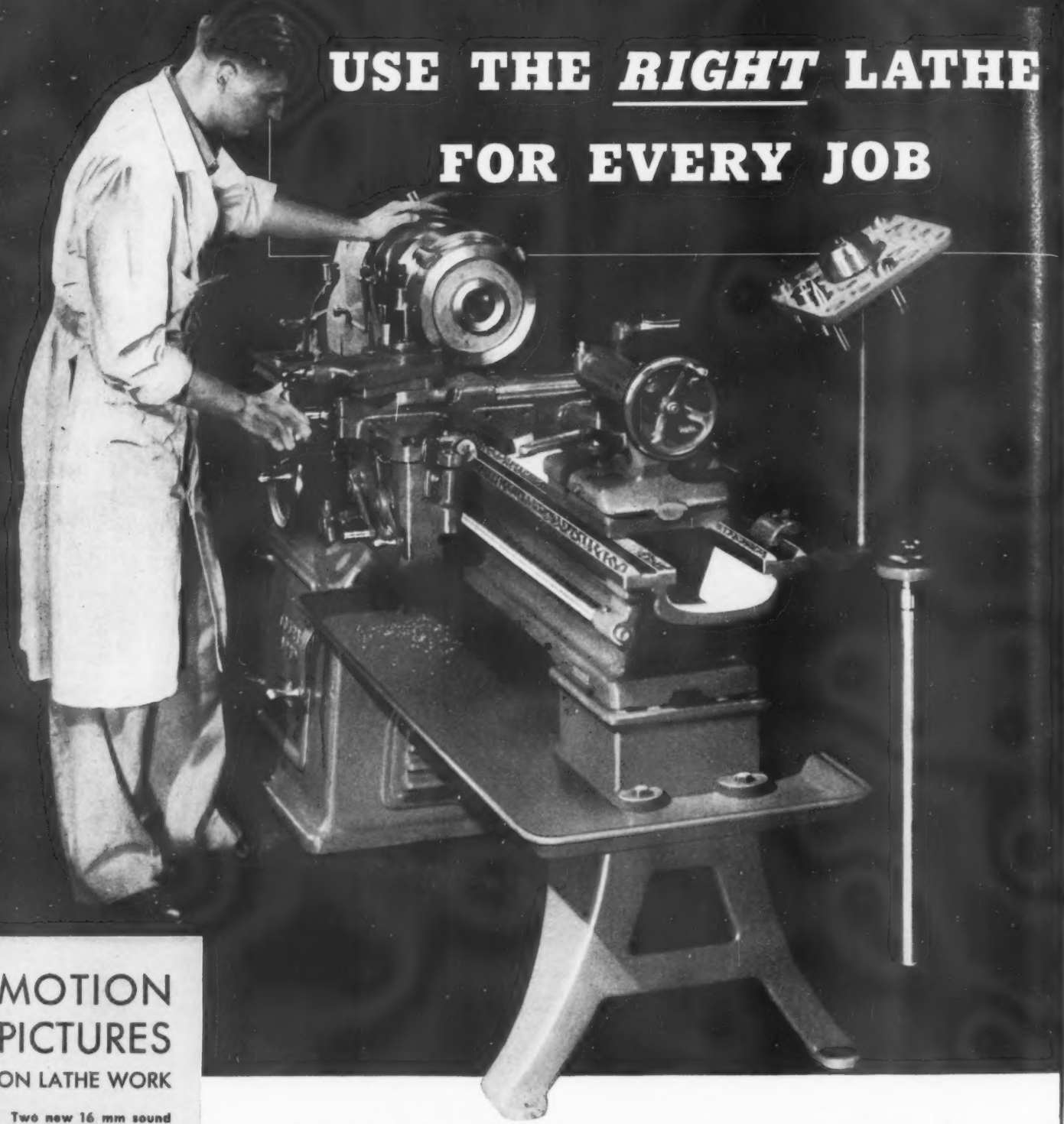
For accuracy—for high production—for continued economy put your jobs on a Fosdick Economax Hydraulic Radial. Consult a Fosdick Representative or write for full descriptive bulletin Fosdick Hydraulic Radials RA.

FOSDICK MACHINE TOOL COMPANY
CINCINNATI · · · OHIO

SEND FOR THE MAN FROM BRYANT

IST

USE THE *RIGHT* LATHE FOR EVERY JOB



MOTION PICTURES ON LATHE WORK

Two new 16 mm sound films in full color are available on a free loan basis for lathe apprentice training in the war industries.

Professionally filmed in our own factory under the direct supervision of competent lathe operators, these pictures clearly show the basic principles of engine lathe operation.

Showing time for each film is approximately 20 minutes. Write today for complete information.

Time, material and manpower can be saved for vital work if you use the *right* lathe for every job. The matching of the job and the lathe has never been more important than today—in no other way can maximum production be obtained. There is no place in our war production effort for slow, obsolete machines of questionable accuracy.

This is proved every day in hundreds of war plants where competent engineers have matched jobs with South Bend Lathes. Their speed, accuracy and ease of operation increase output, hold close tolerances, and conserve manpower for more efficient production.

There is a South Bend Lathe for practically every class of machine work. Toolroom Lathes and Engine Lathes are built in five sizes: 9″, 10″, 13″, 14½″, and 16″ swings. South Bend Turret Lathes are built in two sizes: Series 900, and Series 1000. A wide selection of attachments, accessories and tools are available for special classes of work. Write for information, specifying size and type of lathe in which you are interested.

ARMY E NAVY

SOUTH BEND LATHE WORKS

SOUTH BEND, INDIANA — LATHE BUILDERS FOR 36 YEARS

MAKING MUSCLES FOR MACHINES

Today, as never before, the equipment of war as well as the machines of industry need tough stress resistant forged parts — "muscles" to take the punishing abuse of combat and the wrack of three shift operation.

We're making these "muscles" in ever increasing quantities for planes, for ships, for guns, tanks, ordnance and machine tools — drop forgings, upset forgings, hammer forgings — parts from a fraction of an ounce to many tons each in weight — forgings of every shape and size to meet the insistent demands of greater war production.

Ours is the will to serve. If your requirements for forgings carry a high priority maybe we can help you. Our facilities today are, of course, limited to making forgings for producers of essential machines of war. After the emergency, we will welcome the inquiries of consumer goods manufacturers.

Proudly we fly the Army and Navy "E" flag awarded for excellence and proficiency in the production of War materiel

KROPP FORGE COMPANY

Makers of Drop, Upset and Hammer Forgings for Ships, Guns, Planes, Tanks, Ordnance and Machine Tools

"World's Largest Job Forging Shop"

5301 W. ROOSEVELT ROAD, CHICAGO, ILL.

Representatives in Principal Cities

WAR PRODUCTION COMES FIRST!
To meet the needs of the war production program, plus the emergency demands of our customers, a vast expansion of our already greatly increased production capacity is being speeded. When the national emergency is past, we will have a greater, more modern forging capacity available than ever before — enough to care for the greatly increased post-war demand for forgings that is anticipated. Meanwhile, if you can't get all the forgings you want when you want them, remember we are helping you by serving the cause of Victory!

Making airplane parts on a 20,000 pound drop hammer in the Kropp shops

KROPP

SAVED BY 1/10 OF A HAIR'S BREADTH!

But for a vital replacement part accurately machined, this fighter plane in the South Pacific might be grounded—useless in defending against enemy attacks.

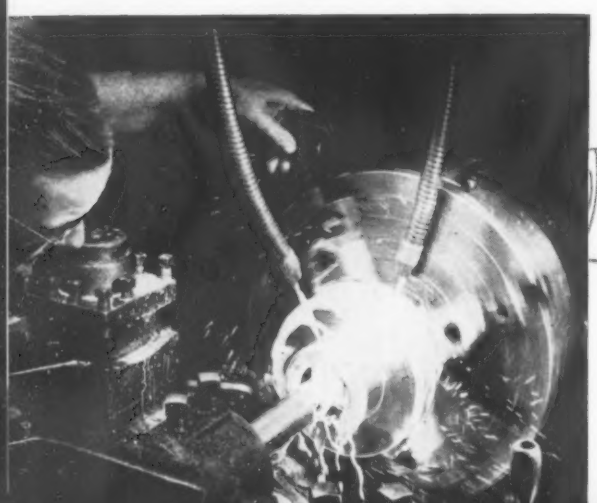
Here is where precision counts! Mass production, with interchangeable parts turned to extremely close limits of accuracy, insures quick replacement and efficient performance.

This is the kind of work which Gisholt Turret Lathes are doing every day—in thousands of machine shops throughout the United Nations—to help supply Allied forces with the equipment they need . . .

And to keep it running!

The Army-Navy "E" and the Treasury Flag fly side by side at Gisholt.

GISHOLT MACHINE COMPANY, 1201 EAST WASHINGTON AVENUE, MADISON, WIS



Look Ahead . . . Keep Ahead . . . with Gisholt Improvements in Metal Turning

TURRET LATHES • AUTOMATIC LATHES • BALANCING MACHINES

SPEED PRODUCTION and they'll get the *Ammunition*

Threading and Forming Tool Holder. Right hand offset — for fine or coarse threading — no tool marks — more pieces per

Awarded to Auto-Ordnance Corporation for excellence in production of "Tommy Guns".

Threading Tool Holder — Straight and right hand offset — threads close to shoulder — no fitting to gauge when grinding —

TRADE MARK
Thompson
REG. U.S. PAT. OFF.

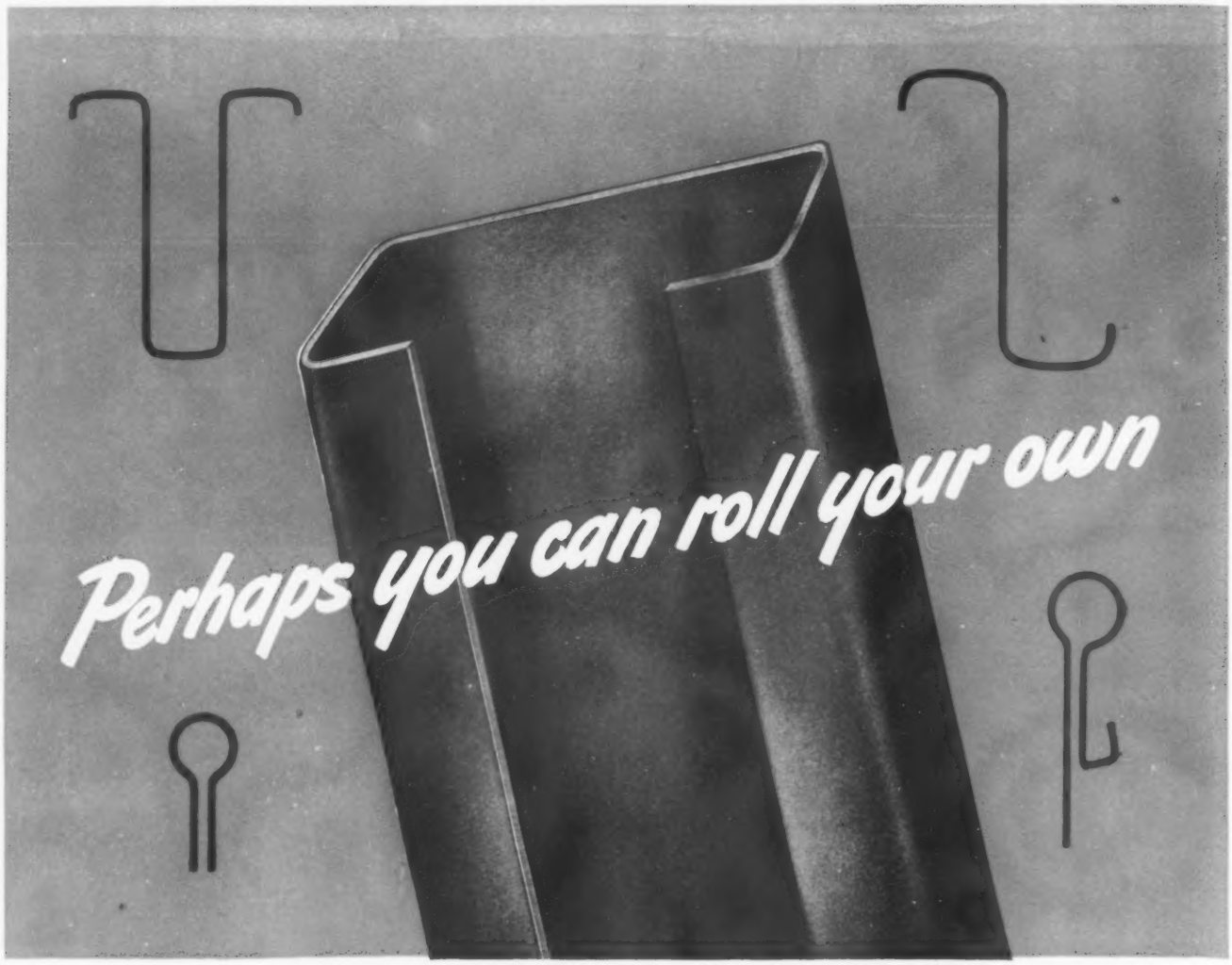
Speed Production and they'll get the ammunition — faster — if Willard Spring Tool Holders are used. Designed specially to speed up production, the "Willard" is accurate, efficient and economical — more pieces per grind — fewer rejects.

Blast the Axis — specify "Willard" and our boys will get the ammunition.

AUTO-ORDNANCE *Corporation*

THOMPSON TOOL DIVISION

342 WEST PUTNAM AVENUE, GREENWICH, CONN.



This shape is rolled from Alcoa Aluminum Alloy sheet in a single operation. Its use may take the place of a thicker extruded shape, thereby releasing metal and extrusion presses for production of vital war materials. Its producer is one of many companies who are roll-forming similar aluminum-sheet shapes.

Many of these rolled-sheet shapes, being produced today for war products, are made of heat-treated aluminum alloys to give them high strength. Often, the "as-rolled temper" strip is fed right from the heat-treating furnace to the forming rolls, before the metal can age-harden, thus avoiding distortion that might occur if heat treatment followed forming.

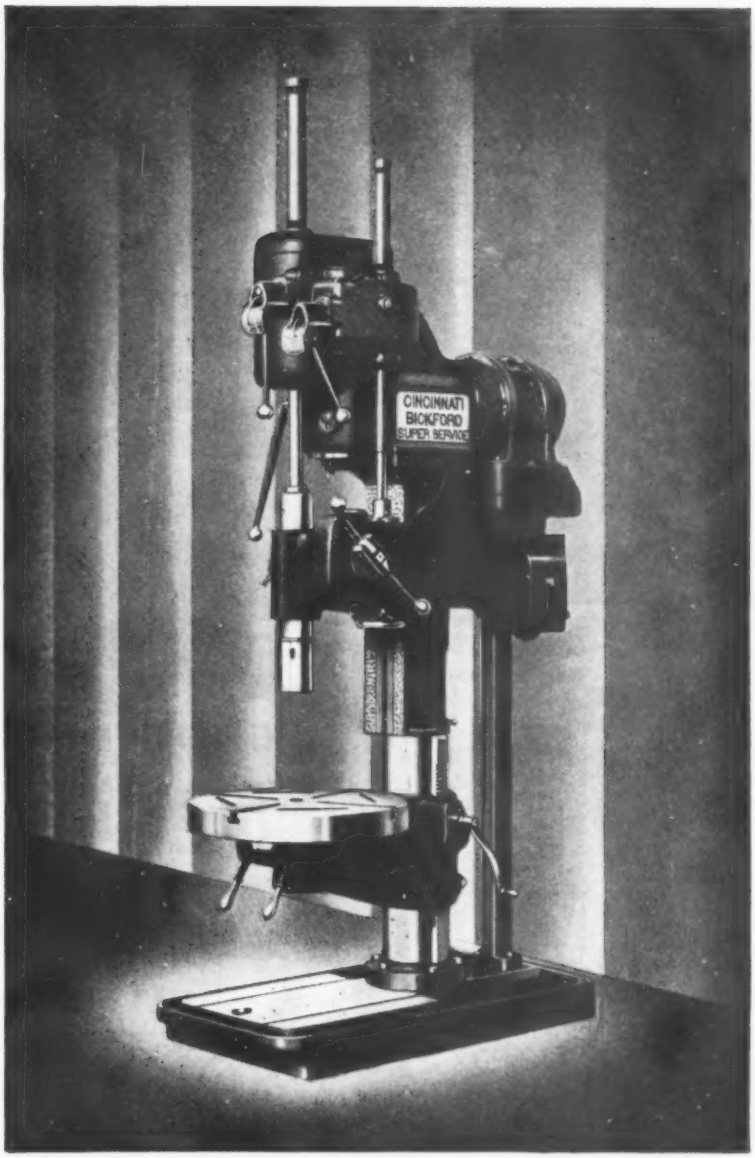
Also shown above, in silhouette, are other rolled-sheet shapes. It doesn't take much stretching of the imagination to visualize a great variety of these aluminum shapes used in numerous products. Exactly the right thickness and shape for strength and stiffness, but no more metal than is actually needed.

The economies possible with large quantity production are certain to cause these aluminum rolled-sheet shapes to be adopted widely for all kinds of postwar applications. ALUMINUM COMPANY OF AMERICA, 2107 Gulf Building, Pittsburgh, Pennsylvania.

ALCOA ALUMINUM

The Super Service BOX COLUMN UPRIGHT

Specialized experience since 1874 has produced the Cincinnati Bickford Super Service Upright Drilling Machine. Built in 21", 24" and 28" sizes, its adaptability, reliability, accuracy, and convenience add up to sound drilling practice.



Every really usable feature that modern engineering can produce is incorporated—direct connected reversing motor drive, positive feed clutch, simplified and convenient lever controls, automatic lubrication, ball and roller bearings throughout, wide ranges of useful speeds and feeds. Summed up, these construction and plus-production features mean easier, faster drilling performance "per dollar invested."

AWARDED SEPT. 10, 1942

Write for detailed information about our complete line of Super Service Upright or Radial metal drilling machines.

The CINCINNATI BICKFORD Tool Company

OAKLEY · CINCINNATI · OHIO · U. S. A.

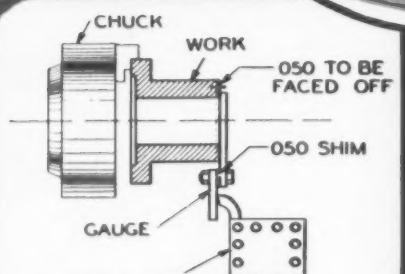
Ideas for VICTORY

...from the Production Lines behind the Firing Lines

Mr. Schoen receives his Warner & Swasey Victory Pin and the congratulations of the joint Management-Labor Committee which steers the Packard Motor Car Company's WORK TO WIN War Production Drive.

IDEAS FOR VICTORY — AWARDED BY WARNER & SWASEY — CHAS. F. SCHOEN

A Citation for Men in War Industry



GEAR BLANK—
Finish after Carburize

● A gauge is made by clamping two pieces of cold-rolled steel together with a shim between them, *same thickness as amount of metal to be removed.*

The gauge is placed against face of work. The cutting tool is then brought against the gauge blade and the carriage locked in this position.

THIS JOB SETTER WORKED OUT A TIME-SAVING WAY TO MACHINE A SHOULDER FROM A FINISHED FACE

CHARLES F. SCHOEN, a job setter in the Packard Aircraft Engine Division, which produces Rolls-Royce engines, is one of several score of turret lathe operators now wearing an Ideas for Victory Pin. These Victory Pins are given to resourceful operators who have developed practical ideas for increasing production.

Mr. Schoen's idea is explained in the accompanying sketch. To machine .050″ off a finished and carburized face when length of piece may vary from job to job, Mr. Schoen made up a gauge that provides a quick way of positioning a cross-slide tool without necessity of measuring each cut.

Many of the ideas sent in to Warner & Swasey are published in Blue Chips, a shop bulletin sent free to the homes of over 38,000 turret lathe operators. Make sure your turret lathe operators are on our list to receive it—it may bring them helpful ideas and inspiration that will be reflected in increased production in your plant. Write Warner & Swasey, Cleveland, Ohio.

You Can Turn it Better, Faster, for Less . . . with a Warner & Swasey

WARNER & SWASEY FOR VICTORY

WHAT'S IN THIS ISSUE

F. O. HOAGLAND

FOR ACCURATE SHOOTING

If allied armies are to get the best results from the guns furnished by the arsenal of Democracy, the gun barrels must be straight and smooth. And if the arsenal is to furnish guns at the utmost practical speed, they must be drilled straight and smooth during the original operation, for taking bends and kinks out of a bore requires time. Then again, straightening may lock up stresses that are released when the gun is fired, making it "walk" off the target. To obtain straight true holes, the drill must be sharpened properly. Machine grinding is recommended by F. O. Hoagland of the Pratt & Whitney Division, Niles-Bement-Pond Company, as the means to that end. Page 91.

A HELPING HAND FOR BEGINNERS

With the accelerated flow of raw untried workers into war-rushed industries, the problem of training personnel grows more and more important. Many of these new employees are women whose only experience with tools has been that of opening cans, and under Mr. McNutt's newly announced worker-draft plans, men with as little or less training will be storming the doors of ordnance plants. Getting these beginners rapidly into production is a potential stumbling block in our war effort.

Though most shops have stepped-up training plans in operation since the war began, the pressure on them is increasing. As an aid in relieving this pressure, the editors of this magazine have in the works a series of training helps, designed to teach the beginner the essentials of the fundamental metalworking operations. The first of these, which introduces the newcomer to the shop, appears in this issue. Page 105.

DOUBLE-DECK ASSEMBLY

The unit assembly principle is utilized by the Vega Aircraft Corporation to increase portability, expedite production and conserve space. In all, over 60 major subassemblies flow to the final assembly line of the Ventura medium reconnaisance bomber. Use of an extensive mezzanine floor for the fabrication of major and minor subassemblies expedites work and conserves space. Harry W. Allen, Vega assembly superintendent, describes the steps taken. Page 121.

PLASTIC PROTECTION

Early in the autumn of 1941, President Roosevelt launched the National Safety Council on its accident prevention drive. Since then ads, articles and authoritative statements have appeared in all major publications. This campaign is bearing fruit, and one of the outstanding results is an outcropping of new plastic machine guards. This may well go a long way toward cutting down the industrial accident rate, for improper guarding of machinery has long been high among the list of causes. The guards are described by D. S. Frederick of the Rohm & Hass Company. Page 100.

LIVE CENTERS

For turning heavy work, odd shaped and hollow parts, as well as for short-time machine operations in quantity production, live lathe centers are frequently used. Their use is otherwise advantageous in that they increase accuracy and prevent wear on the center point itself. Page 99.

SPECIAL DRIVE GETS RESULTS

An active campaign of elimination of dormant tools and materials, conservation of material in production, and thorough reclamation of scrap can be a great aid in relieving the shortage of metal. At the Westinghouse East Springfield works, a special campaign, carried on by management-worker committees in addition to the regular daily salvage operations, uncovered 375,000 lb. of ferrous metals and 25,000 lb. of non-ferrous metals. Studies of existing practices resulted in changes which should make possible considerable future savings. O. J. Greenway tells the story. Page 94.

O. J. GREENWAY

QUICK WORM GEAR INSPECTION

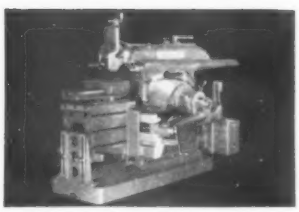
Battle front requirements and production specifications demand accuracy in the machining of worm gears. In quantity production, inspection may lag. To discover quickly any inaccuracies in production of worm gears, rather than to depend upon slower inspection methods which might allow the machining of many faulty parts, a checking fixture has been devised. This fixture and the manner in which it is used are described by V. F. St. Louis. Page 97.

COMING

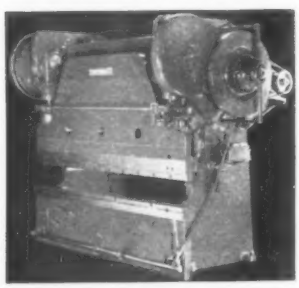
As they heed the call to release men for combat duty, thousands of women are entering factory employment for the first time. To facilitiate readjustment and to aid them in solving personnel and occupational problems, Briggs Manufacturing Company has created a counselor service staffed by trained, mature women. The manner in which this program was set up and the success with which it has met will be described in an early issue.

To pay for plant construction cost in one year, through production economies, is the record of the Gadsden Ordnance Plant. The production line methods, salvage program and training procedures that have gone far to make this record possible, will be described in an article soon to be published.

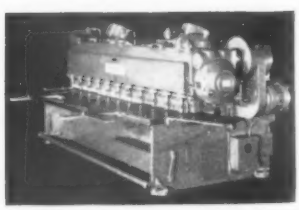
In 1936, The Cincinnati Shaper Company adopted the "Winged Victory" figure as a symbol for victory in production through accuracy. Today, in our minds, its significance has infinitely widened.



SHAPERS



BRAKES



SHEARS

At the end of the road lies Victory.

. . . It's "all out" production in your shop.

. . . It's "all out" production in our shop.

Together, we speed the tools for Victory.

THE CINCINNATI SHAPER CO.

CINCINNATI OHIO U.S.A.

ESTABLISHED 1877 **AMERICAN MACHINIST** BURNHAM FINNEY, Editor

Grind Deep-Hole Drills Properly

Hand grinding limits drill life and results in rough or run-out holes. Machine grinding and the proper resharpening cycles give quality and quantity production

BY F. O. HOAGLAND, PRATT & WHITNEY DIVISION, NILES-BEMENT-POND COMPANY

STRAIGHT SHOOTING takes good marksmanship and good guns too. The best shot or the best gun crew cannot keep on the target if the gun "walks" off when the barrel becomes heated. Essentials of accurate fire are a straight smooth bore and uniform barrel wall thickness—the best way to achieve these results is to drill the barrel straight and smooth in the first place.

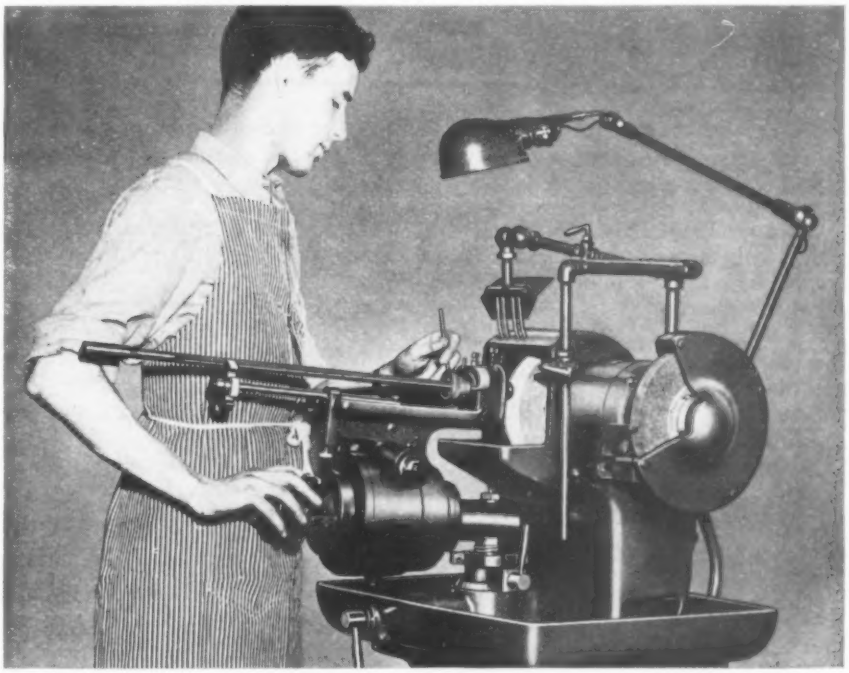
It is true that in the smaller bores—0.30 and 0.50 calibers—and even larger sizes, barrel straightening is common practice. A skilled man can perform wonders in taking bends and kinks out of a bore. But such operations take time, and straightening may leave stresses that come out later when the gun is fired.

Since it is too much to ask a straightener to remove 0.0040-0.0050 in. in a 0.50 caliber barrel, and still feel safe about the gun's performance, reaming and honing are corrective operations. Their chief value is in smoothing the surface of the metal, and removing short kinks left after straightening. But tools used for this work tend to follow the course set by the initial drilling operation. Therefore, the place to start an accurate bore is with the drill—and the important thing about the drill is the way it is sharpened.

The fundamental principle of the single-groove deep-hole drill and the method of drilling deep holes as used today was invented and patented in 1887 by John W. Heyer, at one time in charge of the gage department of the Pratt & Whitney Company. The original patent drawing shows the oil channel through the drill tip and shank, the steps at the drill point for breaking up the chips, and the helical chip groove. The drilling machine has all the elements necessary for continuous deep-hole drilling, including power feed to the drill carriage, oil pump and tank, and a chip pan.

Deep-hole drills for small caliber gun barrels are commonly made of a high-speed steel tip welded to a seamless tubing shank. The tip is drilled longitudinally to match the hole in the shank in order to provide a supply channel for the cutting oil which is so essential in keeping the drill cool and flushing away the chips. With one flute and one cutting lip, the cross-section of the tip looks like a pie with a large piece cut out. This piece is a segment slightly more than one-quarter of the cross-sectional area. The tubing is rolled to the same section.

For sizes up to about $\frac{3}{4}$ in. diameter, the drill is rough ground to break down the point approximately to shape, and is then taken to a special deep-hole drill sharpening machine to finish the point. For larger drills, where the



The modern sharpening machine for small drills, complete with roughing and finishing wheels, insures the grinding of proper lip angles and relief. The wheels follow the original angles, removing a minimum of stock

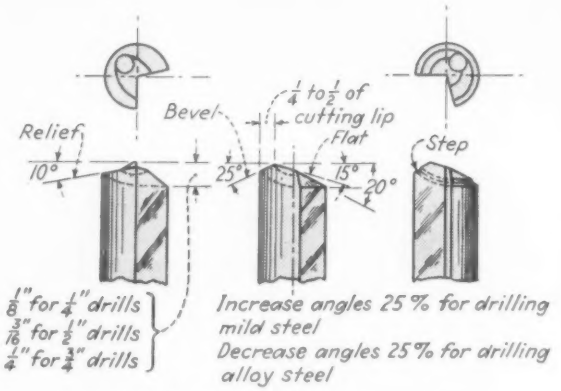


FIG. 1—Drills up ¾ in. diameter

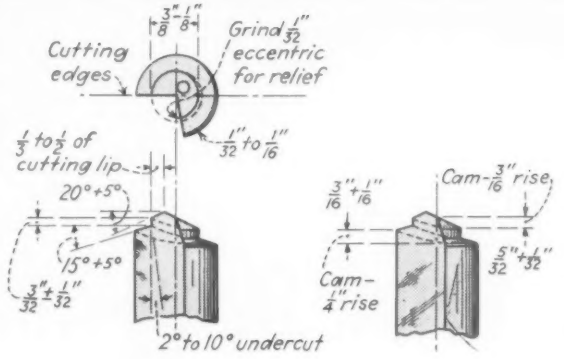
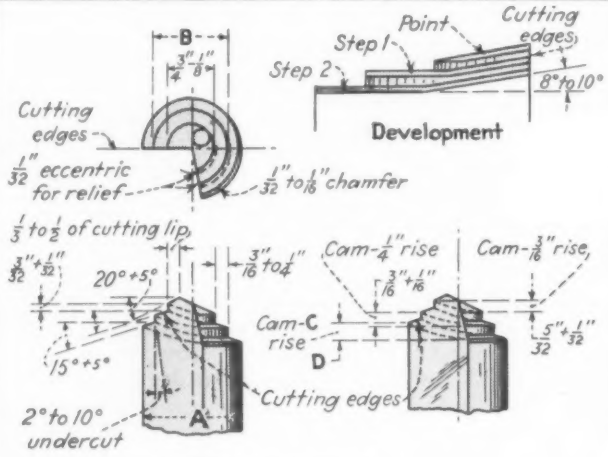
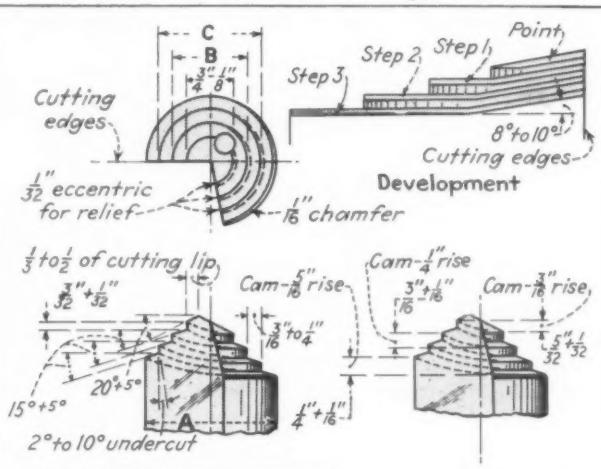


FIG. 2—One-step drills, ¾" to 1 15/64" inclusive



A	B	C	D
1 1/4" to 1 23/64" incl.	1/16" − 1/16"	1/4"	3/16" + 1/16"
1 25/64" to 1 31/64" incl.	1/8" − 1/16"	5/16"	1/4" + 1/16"
1 1/2" to 1 59/64" incl.	5/16" − 1/16"	5/16"	1/4" + 1/16"
1 5/8" to 1 47/64" incl.	1/4" − 1/16"	5/16"	1/4" + 1/16"

FIG. 3—Two-step drills, 1 1/4" to 1 47/64" inclusive



A	B	C
1 3/4" to 1 55/64" incl.	1/16" − 1/16"	1 7/16" − 1/16"
1 7/8" to 1 63/64" incl.	1/8" − 1/16"	1 9/16" − 1/16"
2" to 2 7/64" incl.	3/16" − 1/16"	1 5/8" − 1/16"

FIG. 4—Three-step drills, 1 3/4" to 2 7/64" inclusive

The V-point on small drills and the steps on large drills break chips for easy passage through the long shanks. The steps produce smooth holes and long drill life. The angles can be maintained accurately only by machine grinding

tip is detachable from the shank, the tip may be ground on standard tool and cutter grinding machines using a special attachment.

The smaller drills, say below ¾ in. diameter, are usually sharpened to a V-point as shown in Fig. 1. The chips are thin—from 0.0003 to 0.001 in. The sharp corners at the apex of the V-point splits the chip lengthwise, which facilitates its passage through the chip groove in the drill. On larger drills, where the chips are heavier—from 0.001 to 0.002 in.—the stepped effect of the cutting lip, as shown in Figs. 2, 3 and 4, splits the chip into narrow ribbons for easy passage through the long shanks—the average length of a gun barrel is some fifty times the diameter of the bore.

Sharpening procedure consists of putting the drill into a bushing or holder which is provided with a cam designed to produce the correct helical relief. This cam may be changed to vary the relief for different drill sizes. It is to be noted that whereas one cam only is used for producing the required amount of relief on the bevel of a small drill, it is necessary on large drills to use different cams, having greater rise as the diameter increases at the various steps, in order to maintain about 10 percent relief at the cutting edge of each step.

Sharpening the smaller deep-hole drills consists of three operations; these are illustrated in Fig. 5.

First, the helical bevel is rough ground on one side of the wheel. For average work use a grinding wheel crowned to a point and having a 20-deg. angle on either face. The drill bushing is swiveled to an angle of 5 deg. in order to give a 25-deg. bevel to the cutting edge. Revolving the drill with the cam held against its abutment maintains this 25-deg. angle as the helix is followed for the entire length of the bevel.

Second, grind the flat which, under ordinary circumstances, is about 15 deg. to the cross-section of the drill. Since the drill is moved transversely to the opposite side of the wheel and in this position the 5-deg. angle is subtracted from the 20-deg. crown of the wheel, the set-up described previously gives the desired results.

Third, traverse the drill to the finishing wheel, the procedure being exactly the same as in the first step, except for the grade of abrasive wheel used.

For rough sharpening, a satisfactory abrasive wheel is one having Grinding Wheel Manufacturers Association

Standard B461 M1 5V. The corresponding finish wheel is B801 S7 5V.

The relief angle of the bevel should be about 10 deg., and the bevel from one-quarter to one-half the width of the cutting lip. Too narrow a bevel may cause the drill to cut oversize, and if very small may result in vibration.

The flat, which has an opposite angle to that of the bevel, provides a good clearance at the heel of the drill and gives a free passage of oil into the chip groove.

Angular set-ups for sharpening large step drills, using the grinding attachment on standard tool and cutter grinding machines, are shown in Fig. 6.

Smoothness of the cutting edge is as important a factor on a deep-hole drill as on other cutting tools in order to produce a substantial amount of good work between sharpenings. The modern drill-sharpening machine is therefore provided with a roughing and

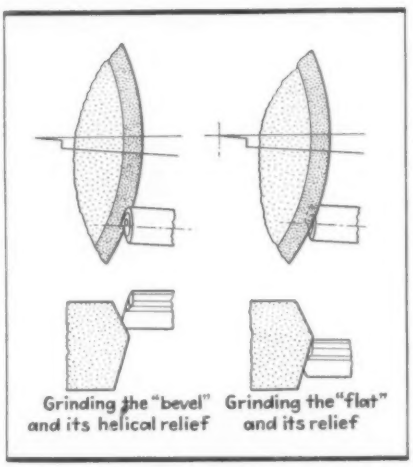


Fig. 5—Helical bevel on drills up ¾ in. diameter is sharpened on one side of a crowned grinding wheel. The opposite side of the wheel is used for grinding the flat and its relief. Both operations are repeated on a second, or finishing, wheel

finishing wheel to meet this very essential requirement. The wheels are mounted side by side, are run at reduced surface speed, and coolant is used to eliminate any tendency to burn the cutting edge of the drill.

When sharpening deep-hole drills by the free-hand method, it is regular practice to use a dry grinding wheel of soft grade and course grit so as not to burn the cutting edge. It is a rare occasion, however, to see the operator touch up the cutting edge on a fine grit wheel or even use an oilstone to smooth it; consequently, productivity of the drill suffers.

Free-hand sharpening of deep-hole drills is one of the machine-shop operations which requires great skill. Like the scraping of a slideway or a surface plate, it must be learned the hard way through actual practice. The man who has acquired the trick of sharpening a small drill—a large one is out of the question—by free-hand grinding, generally guards it very jealously. Consequently, a good many different shapes of cutting points have been developed —some good, some bad, and some indifferent.

Men who can grind deep-hole drills free hand are apt to resent the installation of a sharpening machine, thinking their jobs are at stake. One man said: "Anybody can sharpen a drill on that machine—even a girl could do it." That was the very purpose in view: put a girl to sharpen drills so as to release a man for some other operation.

With the high production of gun barrels to be drilled at this time, with the scarcity of high-speed steel, and with the skilled labor required to make the drills, their proper sharpening has become an important factor. When considering this fact, it is well to remember that barrels per drill is the important point, not barrels per grind.

A drill performs best when sharp; in fact, that is the only time it will drill a smooth straight hole without run-out and with the chips cleared properly. Once the cutting edge becomes dull, the phenomenon of the drill tending to follow the centerline of a revolving piece of work has been lost, and the drill starts to wander. Eventually, the hole becomes too small and begins to pinch the drill, wearing down the side of the tip. This action destroys the slight relief and back taper with which the drill tip is made for necessary clearance, and will cause it to stick like a taper pin. To restore such a drill to usable condition, from ¼ to ¾ in. of the tip may have to be cut off before it can be resharpened—a useless waste of valuable tool steel.

Take for example the case of one contractor making 0.30 caliber machine guns who ordered deep-hole drills in such quantities that the supplier had difficulty in keeping up with his demands. The drill manufacturer asked where all the drills were going. The answer came back that each drill was good for only eight to twelve barrels. Astounded at this fact, the drill maker checked further and found that although the contractor had a drill sharpening machine, the shop had resorted to hand grinding. When this practice was stopped and machine grinding restored, production went up to over 300 barrels per drill.

Sharpening of gun drills should be mandatory after a specified number of

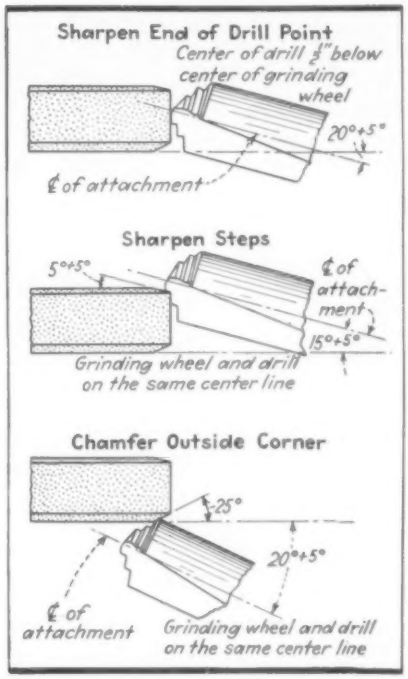


Fig. 6—The three set-ups for sharpening step drills are shown here. The work is done in a special attachment on a tool and cutter grinder

barrels have been drilled. If it be found in a test run that drills dull after six barrels, they should be resharpened after drilling four barrels. It is better to undershoot the maximum in selecting a regular resharpening cycle than to run the risk of using a partially dull tool that will give inferior performance.

Frequent resharpening means that the drill tip will need only to be touched up to be restored to first-class condition. Machine sharpening insures that the original angles of the drill will be followed, thus necessitating the removal of only a slight amount of stock. The wasteful variables inherent in the best free-hand grinding are thus avoided.

The sharpening machines are very flexible and can be adjusted to sharpen deep-hole drills with cutting angles and relief to give the best results. This is true whether the drilling is done in low-carbon steel, requiring a fairly pointed drill, or in heat-treated alloy steel where the drill point has a flatter effect—yes, even to meet almost any pet scheme developed by the drilling machine operator, if necessary.

The most satisfactory results are obtained by having the sharpening machine placed in the toolroom and operated by one person responsible for supplying the drilling machine operators with sharp drills. To have everybody sharpen their own drills invites confusion and free-hand sharpening.

Salvage Campaign Yields Dividends

BY O. J. GREENWAY, WESTINGHOUSE ELECTRIC & MANUFACTURING COMPANY

TO MAKE the guns, tanks, planes and ships needed to arm the fighting forces of the United States and the other embattled free nations throughout the world requires vast quantities of materials of all kinds. The demand is so immense that our normal raw material sources cannot adequately supply present day requirements. In many cases the shortage of scrap is holding up production. Steel mill furnaces urgently need more scrap, while some war plants are slowing down for lack of steel and other materials.

To uncover every salvagable piece of scrap in the plant, a special campaign was launched at the Westinghouse East Springfield works recently. This campaign, superimposed upon the regular daily salvage operations, included a thorough house-cleaning to uncover dormant scrap and equipment in every nook and corner of the plant, including the engineering department and laboratories, storerooms, tool cribs, and tool boxes of employees. The campaign extended for a two-week period, and yielded 375,000 lb. of ferrous metals and 25,000 lb. of non-ferrous metals.

A committee consisting of a general chairman, co-chairman and secretary, and a representative from each division in the plant was appointed to coordinate and stimulate the campaign, and record the results. The first week of the campaign was designated as management week, in which the superintendents and foremen of the various departments had an opportunity to see that all excess material was removed to our salvage department. This material was exclusive of our regular production scrap. The scrap tags used were marked with a large red "C", indicating that the material should be recorded against the special salvage campaign.

For years we have diligently campaigned against waste and defective workmanship, and believe that we have been able to keep such losses to a minimum because of the real support and genuine interest our people have taken in this program. In every department throughout our plant, we had set up waste and defective workmanship committees composed of workers, union representatives and foremen, who meet at regular intervals to analyze and discuss performance with the intent of finding remedial answers to our problems. We knew these committees would make a splendid contribution to the special salvage campaign, so we invited their support in this effort. The second week of the campaign was turned over to them.

The theme of our campaign was "Collect our Scrap and Build a Tank." We placed large 6x8 ft. posters at each entrance of the plant—and had a large tank painted on them with a scale at one side. The tank was gradually filled in with red as our scrap collection progressed and the scale indicated the percentage of the accumulated weight of scrap collected in relation to the weight of steel required to build a tank.

Posters of a like nature were exhibited throughout the plant in conspicuous places. A four-page leaflet setting forth this program was distributed at the entrance to both the outgoing and incoming shifts so that every person located in the plant would be scrap salvage conscious. During the campaign, periodic bulletins were issued to stimulate all-out effort.

Special areas were set aside in the various sections of each department, so that people might place the scrap they gathered at the designed spot, to expedite rapid collection and disposition. The cooperation and the coordination of the various groups in this drive was splendid, and the result was a much

In addition to collecting all possible scrap within the plant, employees were given an opportunity to contribute scrap from their homes. Large containers at each entrance were provided for this purpose. Money collected from the sale of this scrap was donated to the Red Cross

The most recent installation in this salvage department is equipment for briquetting cast iron borings and steel turnings. The steel is first fed into a crusher which pulverizes the turnings. Crushed chips then are fed into the briquetting machine

cleaner plant and one in which no excess metal is hidden in corners or lockers that could be used in our war program. Several of our employees suggested that we permit them to contribute scrap from their own homes. We, therefore, provided large containers at each entrance for this purpose and the sales proceeds were donated to the Red Cross.

The committee organization that operated so effectively during this campaign will continue to function for the duration, and will be known as the Material Conservation Committee. This committee has been working actively in the promotion of ways and means of not only seeing that scrap material is disposed of properly and promptly, but is aggressively attacking the problem of conserving materials by substitutions of less critical material, more efficient use of tools and materials, and reduction of defective work. In addition to making a complete survey of our tools, dies and fixtures to ascertain what we now have that could be scrapped, we intend to make sure that no future tool equipment is stored unless it is known definitely that it will be used again.

Close on the heels of the metal campaign, the committee launched another plant-wide drive to conserve paper. Again, the accomplishments exceeded expectations. Employees throughout the plant at once began to thin out files and cabinets, and thousands of no longer useful reports and papers found their way to the salvage department to be made into scratch pads of different sizes; thus eliminating the need for purchasing new paper scratch pads. The committee distributed rubbish containers throughout the plant, and requested employees to deposit wax paper and carbon paper which cannot be used again for collection daily. During this

short campaign 10,000 lb. of paper was collected and, in addition, eight steel four-drawer file cabinets were made available for other service.

This material conservation committee in its short term of operation already has accomplished a number of very beneficial results. Numerous ideas that eminate from the various departments are broadcast in frequent bulletins, in order that the entire plant may benefit. Briefly, some of the major problems that were attacked were:

1. *Conservation of Rubber*—Extensive substitutions of metal pipe have been made for rubber hose on machines. The hose previously required replacement every few months. Where the use of rubber is absolutely necessary, it is cleaned and protected with a preservative coating known as "Orel" which helps keep the surface of the rubber soft and prolongs its life.

2. *Conservation of Tool Steel*—Hard chrome plating, while not new to the machine tool industry, has not been used to the extent of its possibilities. Our committees have spent considerable time and effort in the development of hard chrome plate, and we have had some very outstanding results. In the case of new tools and punches, the operating life of cutting edges has been increased and the number of regrinds reduced. This eliminates considerable set-up time and also results in more accurate work. Considerable success has also been had with worn tools. Many of these tools formerly were scrapped, but are now reclaimed and reused because we are able to rebuild them by chrome plating.

Chrome Plating Saves Steel

An interesting example of our success in hard chrome plating is in the tool used for making a valve for one of our war products. This was a bottleneck job which ran three shifts around the clock, and it was necessary to grind the tool once or twice each shift—the average being four to five grinds per day. Much valuable steel was ground away each time due to the deep scores in the groove. This tool was chrome plated and for seven full three-shift days the tool performed perfectly. It was then removed, ground and replated. The second, third and fourth runs equalled, and in two cases bettered the first performance of that tool. Estimates show that we will save approximately 450 lb. of tool steel a year on this one application. In addition there will be a saving of money on tool grinding and the tool can remain longer in active production.

3. *Conservation of Steel in Production*—Bulletins have been issued by the main committee to the entire plant with illustrated information on ways to produce more parts for a given poundage of metal by utilizing the latest developments in metal fabrication. Furnace brazing of materials has been one of the suggestions approached aggressively with successful results. Large amounts of material have been saved by the use of this process.

4. *Material Reclamation*—Many materials formerly scrapped are now reclaimed and converted in our salvage department for further use. Outstanding examples are as follows:

a. Metal waste trimmings are converted into usable parts.

b. Briquettes are made from steel, aluminum and cast-iron chips.

c. Pure copper waste is used for copper plating. The scrap copper is baled, placed in baskets and used as anodes in plating tanks.

d. Scrap steel is baled and sent to steel companies to be made into steel bars.

e. Waste wood from packing boxes is used again for shipping purposes.

5. *Substitutions* — Our engineering department, working in conjunction with the committee, has made many contributions in the substitution of materials. The engineers are kept constantly familiar with the status of critical materials, and substitutions of less critical material are made wherever possible. Consequently tons of critical metals are freed for other essential use.

Simplified Training is Best

By FRANK C. HUDSON

Apprentice training is most effective if reduced to an exposition of the simplest rudiments and treated with a sympathy for the greenness of the student. One of the greatest mistakes an instructor can make is to let the learner get the idea that he, or she, is up against a hard job. It is easy to scare him at first and so make it hard to get started.

Learners gain a great sense of responsibility and apply themselves more thoroughly if their practice work is part of actual production. Parts which pass inspection can go into production assemblies; those which are spoiled go to the scrap pile.

There may be cases where beginners can be taken directly into the shop and started on simple operations. But in most shops it is better to have the preliminary training done in a school shop near the main plant.

Learners who are to build parts of a large scale assembly need be trained only in one or two operations. If at some later time they are to be shifted to other work, this will be made easier by their familiarity with the shop, and with the work they are already doing.

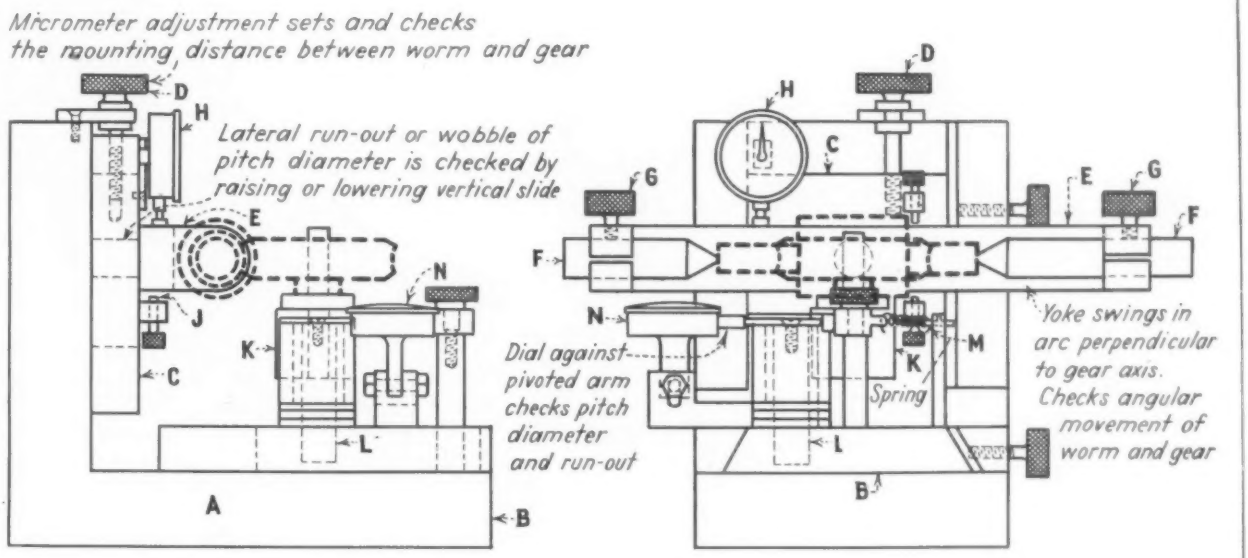
Having mastered a few simple operations on a lathe, or milling machine, the learner has a foundation on which can be built a fairly complete knowledge of the various work that can be done on the machine. Even the simplest operation makes the learner familiar with the fundamental movements of the parts of the machine. With this as a basis anyone who is really interested in the machine, or in its operations, can become acquainted with its possibilities in a wide variety of work. Builders of the machines publish manuals that show how they can be used in a variety of work. There are also a number of very practical books which show how different kinds of work is done. These are invaluable to those who want to become experts.

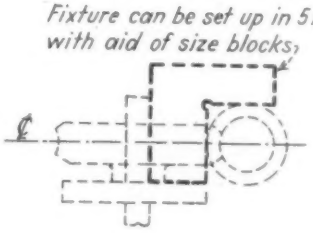
Trainees for mass production however can be taught to run almost any standard machine on simple operations in a few hours. If they fail to make a fair production time in a few days, they need more instruction which can usually be given on the machine itself. It frequently takes but a few suggestions, and a little "showing" by the instructor, to bring the speed up where it belongs.

One of the headaches of any training program is the finding of good instructors. There is a knack, or an art about teaching that few good mechanics seem to possess. The highly skilled man has forgoten how green he was at the beginning and is apt to lose patience when the learner forgets and makes the wrong move. Then, in too many cases, the teacher of this kind shows the learner by doing the work himself. This same failing is found in some good workmen when they become foremen.

Instead of telling, and showing learners how much the instructor knows, by picturing the job as being very difficult, the instructor should divide the work into such simple operations as can be easily understood. And he should emphasize the simplicity of the work instead of making it seem difficult. By impressing on the learners the fact that the operation is simple and not complicated, the instructor makes his own work easier and trainees learn rapidly.

Accurate Inspection of Worm Gears





The center distance between the worm and gear and their mounting distance are set quickly by the adjustable slides on the fixture. The helix angle of the gear teeth, pitch diameter run-out, and lateral run-out or wobble are checked simultaneously after set-up is made

Precise functioning of some war equipment depends on accuracy of worm gears. It can be maintained by checking the assembly in the fixture

BY V. F. ST. LOUIS, GENERAL ELECTRIC COMPANY

IN THE MANUFACTURE of worm wheels that will run free without backlash, it is essential that all dimensions be maintained accurately. These dimensions include the center distance between the worm and worm wheel, the mounting distance of the worm gears, the helix angle on the gear teeth, pitch-diameter run-out, and lateral run-out or wobble of the assembly.

The rigid specifications to be met by the manufacturer demand accurate checking of dimensions on the worm and worm wheel. This is especially true if those worm and worm wheel combinations found in equipment used by our armed forces are to function properly.

It was found when quantity production started on such worm gears that usual checking and inspection methods were slow, that slight inaccuracies were sometimes overlooked, and causes for errors during production were discovered after many parts had been machined. The illustrated checking fixture, wherein the worm and worm wheel combination can be inspected quickly and accurately, overcame the objections.

The fixture consists essentially of solid base *A* and two slides *B* and *C* that move at right angles to each other. Slide *C* is moved vertically in suitable guides by adjusting micrometer screw *D*—this controls the mounting distance between the worm and the worm wheel. Affixed to slide *C* is a yoke *E* wherein centers *F* are mounted and locked by setscrews *G*. Yoke *E* is pivoted to slide *C* and is free to rotate in a plane perpendicular to the axis of the worm gear mounted between the centers. Movement of the yoke, effected by the meshing worm and worm wheel during inspection, is transmitted to indicator dial *H*, which shows the angular deviation of the worm in minutes of a degree. For convenience during inspection,

stop *J* is mounted on slide *C* directly below pivoted yoke *E*.

Slide *B* on which the worm wheel is located is adjustable horizontally for varying the center distance between the worm and worm wheel. The latter is mounted on arm *K* that pivots about pin *L*. Thus the worm wheel is swung into mesh with the worm, where it is held by spring *M*. Any movement of the worm wheel in contact with the worm is registered by indicator *N*. This dial registers movement in 0.001 in. and indicates any deviation in pitch diameter of the worm wheel; also, it reveals pitch diameter run-out.

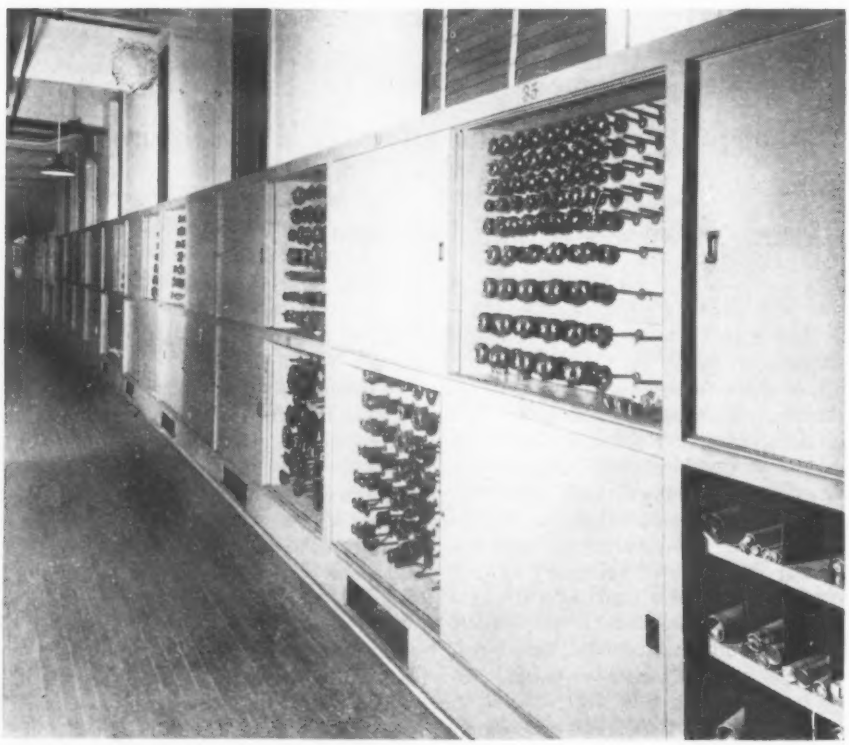
Lateral Run-Out Checked

A condition of worm and worm wheel combinations which is often disregarded, but which has a definite effect on good performance, is lateral run-out or run-out that allows the worm to contact first one side and then the other side of gear face. This can be checked readily on this fixture by moving slide *C* until the worm wheel is in perfect mesh with the worm, and then taking a reading. Any wobble resulting from such lateral run-out can be determined at a glance.

Should the inspection of worm and worm wheel combinations reveal lateral run-out or wobble, pitch diameter run-out, or errors in center distances and the helix angle of the worm or gear, changes can be made immediately in the hobbing machines producing the parts. This has cut down set-up time, and eliminated some material waste by finding and correcting errors earlier than would have been possible without the aid of the fixture.

The illustrated fixture was designed to inspect a variety of worm and worm gear combinations, the maximum and minimum adjustments of slides *B* and *C* being the controlling factors. Larger fixtures can be used in progressive steps to accommodate the size ranges of all worm gears manufactured.

Fast and accurate inspection, as well as elimination of inaccuracies that affect the functioning of worm gears, are advantages of this checking fixture



Handy Storage Saves Tools

To solve the critical need for tool storage space, and at the same time provide greater efficiency for finding tools in stock, Barber-Colman Co., Rockford, Ill., built a series of cabinets with sliding doors, along an otherwise unused corridor wall. These cabinets have individual pegs to hold hobs and cutters, stand approximately 7ft. high and 16 in. deep and extend for a length of 80 ft. The cabinets are numbered in sections and tools are easily located by their section numbers. Better light, ease of locating and handling, and proper storage to avoid damage has been the result of this development.

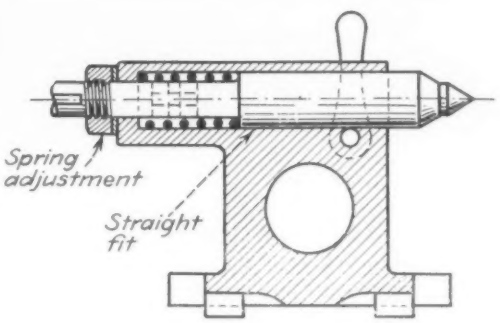
Applications of Live Centers

BY JOHN G. JERGENS, NOBLE & STANTON COMPANY

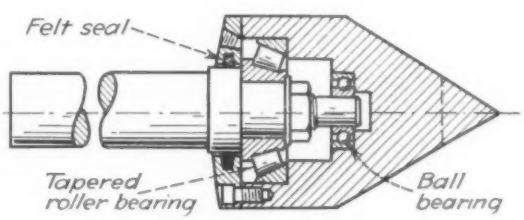
LIVE LATHE CENTERS, especially those with ball and roller bearings, are used for turning heavy work, hollow parts and jobs on which solid centers will not function properly. At other times, a spring-actuated center is a convenience, particularly where machining time is short and quantity production is involved. Designs of such centers, some types of which can be purchased, are shown in the drawings.

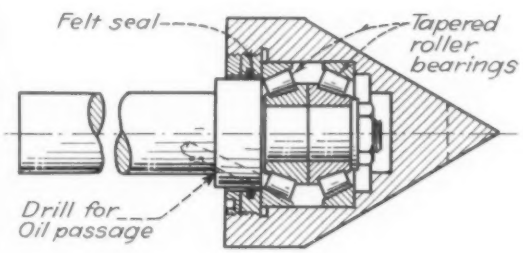
Live centers prevent wear on the point of the center itself and tend to increase the accuracy of the work. They also eliminate the necessity of lubricating the lathe center, which is not always easy or satisfactory. For example, on heavy forged rolls it is necessary to use white lead or similar heavy lubricants on solid centers while turning. For turning hollow work, such as pipe, large coned centers fitted with non-friction bearings are convenient; however, for light turning on small hollow work, centers with plain bearings have been used.

Special centers are frequently made to accommodate work that is out of the ordinary. A live center may be square of some special shape to fit an opening in the end of the work. Live centers are in some cases furnished today as standard equipment on lathes.

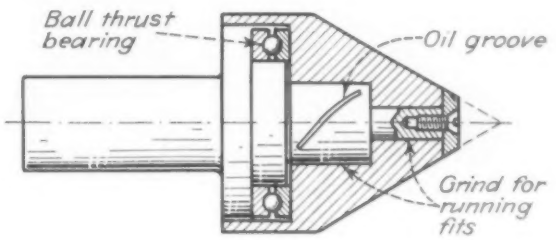


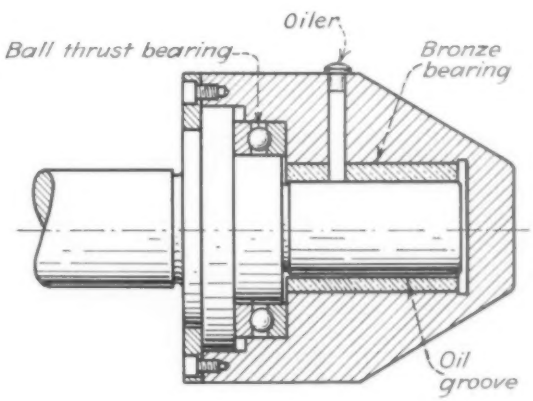
Spring-actuated centers speed production where machining time is short and quantity lots are involved

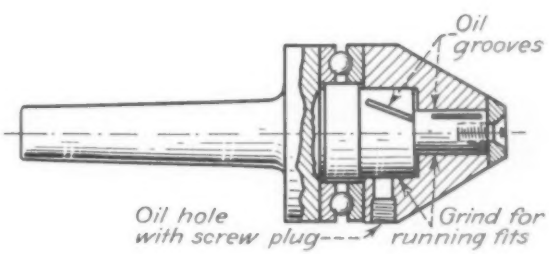




Live centers may have ball and tapered bearings. Those with only tapered bearings are commonly used when the center is built into the tailstock



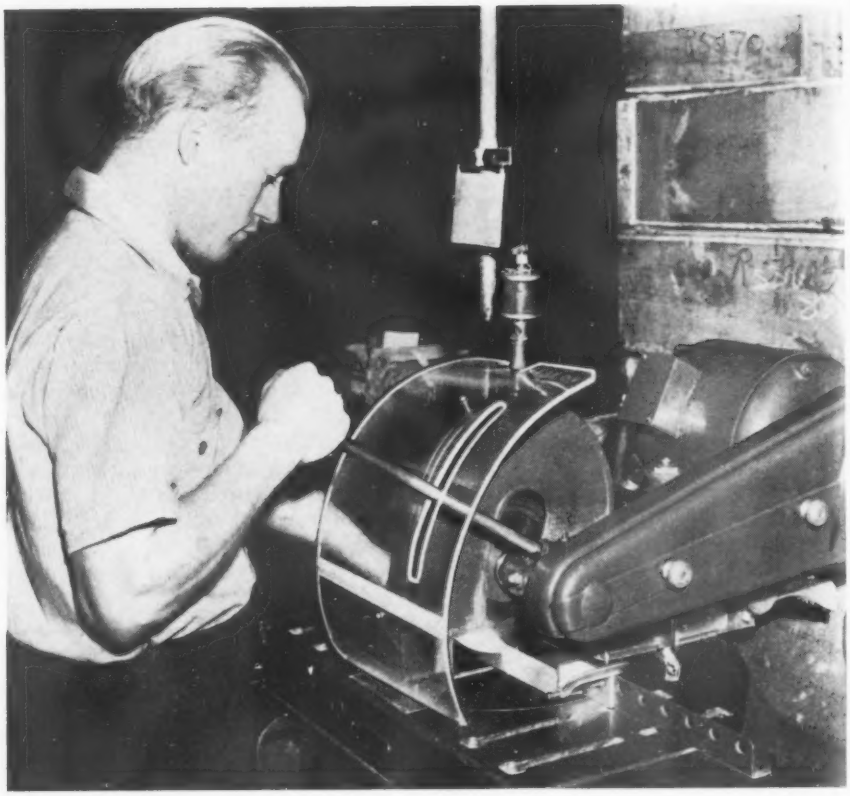




Revolving centers with ball thrust bearings can handle small and large work. Larger sizes often have bronze bearings to reduce friction

Plastic Safety Devices Reduce Accidents

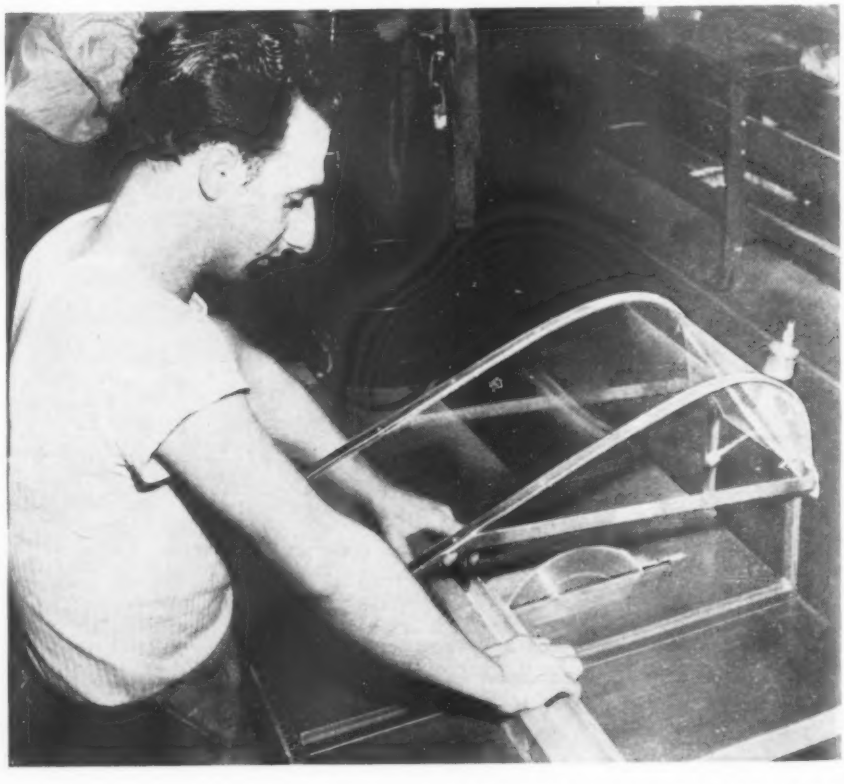
By D. S. FREDERICK
HOLM & HAAS COMPANY

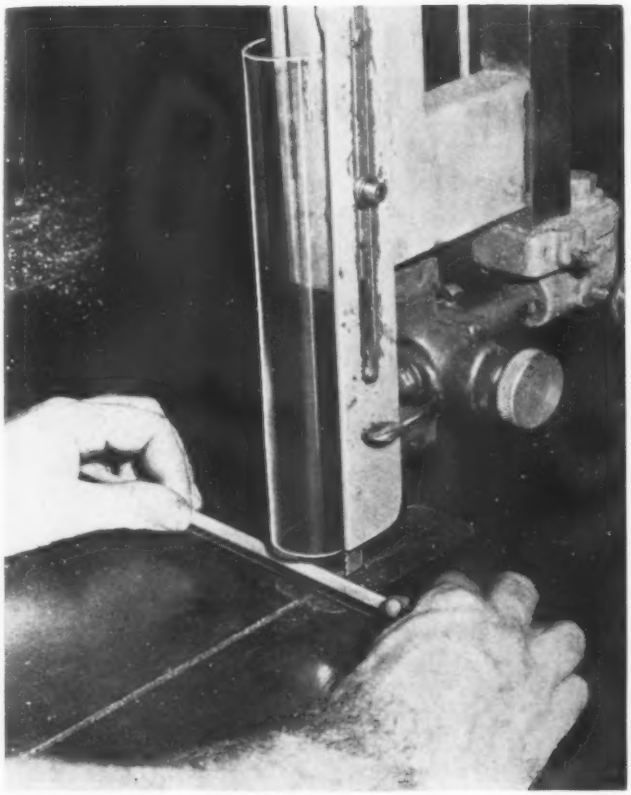


Machine guards have been fashioned from thermoplastic Plexiglass by Republic Aviation's methods engineering department for use on circular saws and grinders. Parts are shaped at temperatures of 200 to 330 F. The shields are cleaned with soap and water, or a water solution of a synthetic wetting agent, aided by the worker's bare hands. Rubbing with a dry rag may scratch the plastic surface and builds up an electrostatic charge which attracts dust. Damage may be avoided by blotting with a clean damp chamois. Application of wax before using prevents scratching

WHEN President Roosevelt launched the National Safety Council on its intensive industrial accident prevention campaign in the fall of 1941, over 3,970,000 workers had been put on record as maimed or injured during the year. High among the causes of occupational accidents were improper guarding of machines, responsible for 27 percent of the injuries; 34 percent were attributed to hazardous set-ups. Over 4 percent of the injuries were to workers' eyes, 7 percent to heads, and 22 percent to fingers.

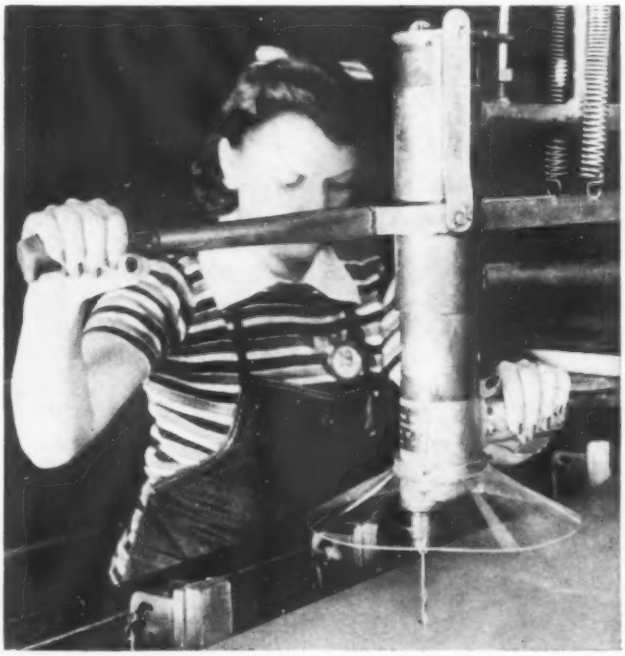
The Safety Council's accident prevention drive is bearing fruit. Especially in aircraft plants are safety conscious workers and engineers devising special face shields and guards for bandsaws, drill presses, grinders and soldering equipment. They are made from materials at hand, particularly tough transparent plastics used for gun turrets and bombardier compartments in planes. In one plant alone, the mandatory use of full-length plastic face shields for machine and portable-tool operators reduced eye injuries from 32 to 16 percent in five months.



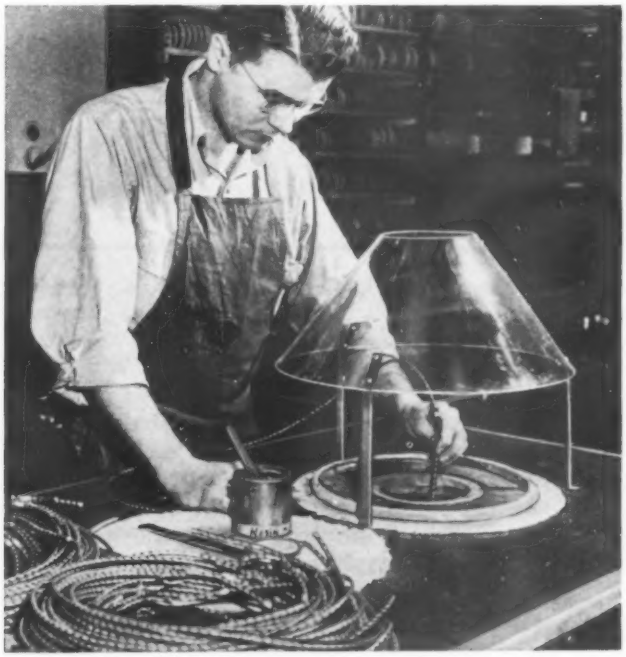


Plastic bandsaw guards are used by North American Aviation. This company uses full-length plastic face shields throughout its plant with excellent results. For example, in January, 1942, 32 percent of medical cases were eye injuries; by May, five months later, the figure had dropped to less than 16 percent

Special face shields protect men working in Consolidated's anodic heat-treating department where duraluminum parts are anti-corrosion coated by dipping in vats of molten salt. The shield is attached to a helmet and tilts back on top of the head when not in use. It protects workers from high heat and burns in case of splashing



Skirt-like bells have been developed by Consolidated Aviation workers for drill presses. Similar shields, easily made from plastics, protect workers from flying chips and splinters during drilling, grinding and chipping operations



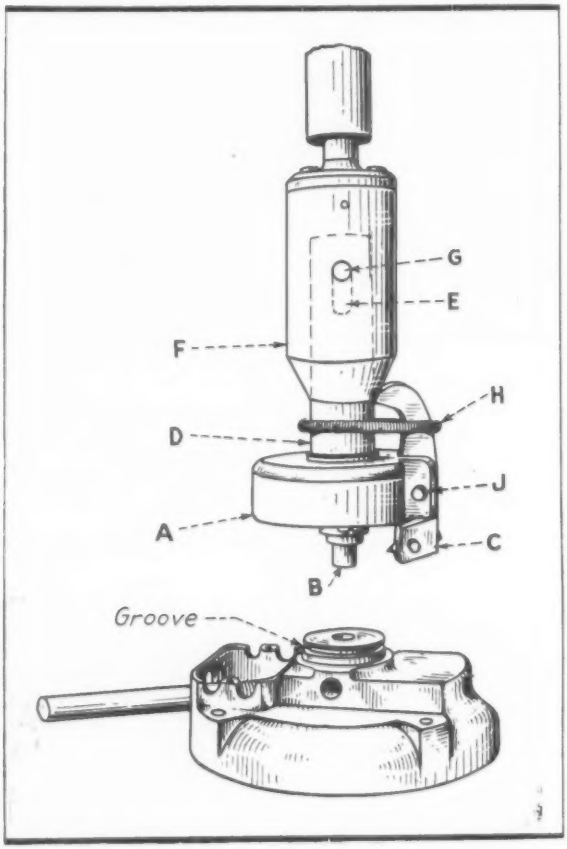
Soldering operations have been safety insured in Bell Aircraft's electrical department by placing a transparent plastic shield over soldering pots. Many such ingenious safety devices have been developed by workers themselves

IDEAS FROM PRACTICAL MEN

External Grooves Cut On The Drill Press

BY C. T. PACKER
Westinghouse Electric & Manufacturing Company

The illustrated tool, designed to operate on a drill-press spindle, will machine external grooves accurately in hubs, brackets and similar parts having a hole in the center in which a pilot can be located. The work must



When the pilot of this toolholder is centered in the work, the tool is in position to cut the groove. As the cam descends, telescoping on the shank of the toolhead, the tool is fed horizontally into the work

be located on the drill-press table in alignment with the spindle. It is necessary to secure the work only to prevent rotation. The grooving tool consists of head *A* in the center of which is a ball-bearing pilot *B*, and which also carries a cam-actuated grooving toolholder *C*. Toolhead *A* has a shank *D* through which is a cross slot *E*. Cam sleeve *F* telescopes over the toolhead shank and a cross pin *G* passes through the sleeve and slotted shank, thus completing the assembly. The toolholder arm is held against the cam by spring *H*.

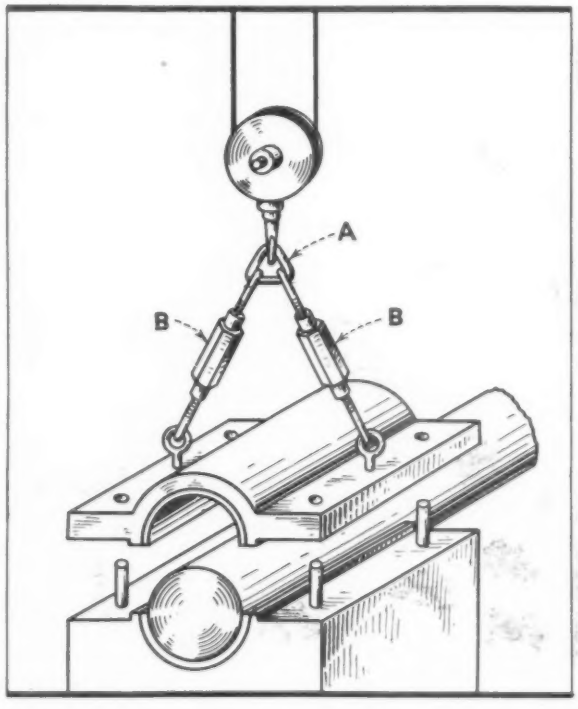
When the drill spindle descends, the shoulder on pilot *B* will stop on the top of the piece, thus bringing the cutting tool in location for machining the groove. As the spindle continues to feed downward, telescoping the cam sleeve on the shank of the toolhead, the arm of the grooving tool is pushed outward. Since this arm turns about hinge pin *J*, the grooving tool is fed horizontally into the work. The depth of groove is governed by a stop on the drill-press spindle. This grooving mechanism, which can be fitted with cams and tools for a variety of jobs, is exceptionally rugged and accurate in its performance.

Turnbuckle Slings Center Heavy Loads

By NELSON HALL

When handling heavy bearing caps with conventional slings, it is difficult to lower them over the bearing studs without binding. This necessitates the use of a pinch bar with frequent injury to bearing seats or stud threads. Such difficulty can be avoided by using the illustrated sling comprised of ring *A* and turnbuckles *B*.

After the bearing cap is lowered to a position just above the studs, it can be leveled and slipped into place easily. The same sling can be used for mounting machine tool headstocks, carriages, tailstocks, jigs and fixtures, as well as setting up heavy work. It is often invaluable in the assembly of large cumbersome parts.

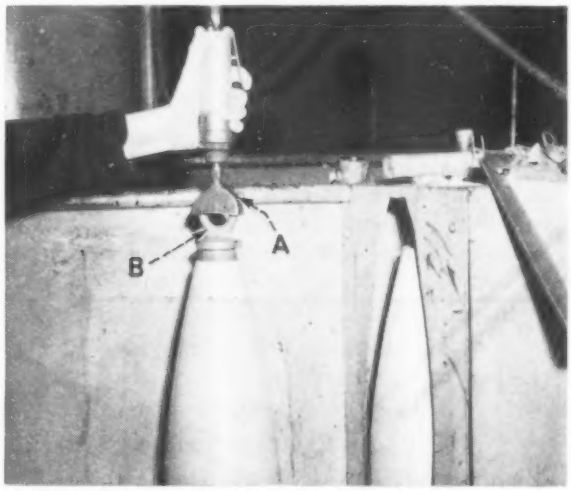


A sling comprised of two turnbuckles can be used to center or level large cumbersome parts during assembly operations

Shell Lifting Plugs Applied With Air Drill

By ELLIOTT HUTTON

Experimenting with various devices to facilitate screwing lifting plugs into the nose of shells, we found that an Ingersoll-Rand Model OL pneumatic drill with a lever throttle worked satisfactorily. The drill was fitted with an adapter or cap *A* which slips



An air regulator controls the torque of this pneumatic drill adopted for applying and removing shell lifting plugs

loosely over the ring *B* of the plug. The entire unit was suspended from an I-beam by a spring fastened to a set of rollers. This set-up permits the operator to cover an area governed by the length of the I-beam.

The torque necessary to screw in the plug may be adjusted by an air regulator in the line. The torque and peripheral speed can then be brought under control. A reversible unit can be used for inserting and removing the lifting plugs.

Machining High-Pressure Oil Valves

BY FRED H. COLVIN

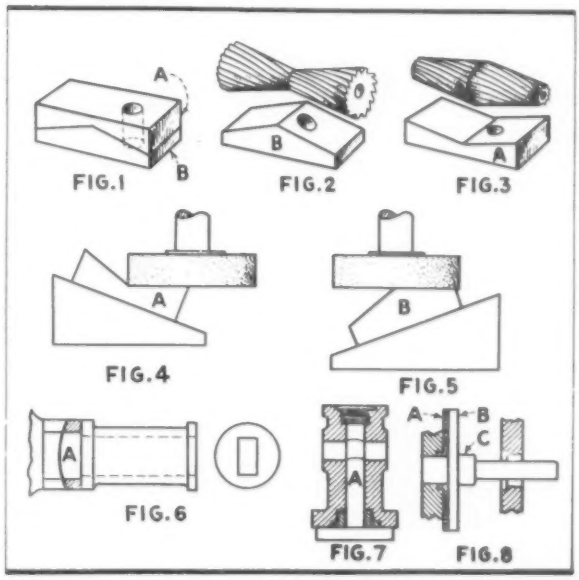
Among the products made by a small shop in Texas is a special gate valve for use under high pressure in the oil fields. This valve is interesting both in design and in the methods used in making it.

The gate is in two parts as shown in Fig. 1. The connection for the screw that is attached to *A* and moves both parts, is not shown. The hole through both parts of the gate gives a straight opening from inlet to outlet through the gate and the body of the valve. In closing, part *B* strikes an obstruction when it reaches the bottom and the inclined surface wedges the parts against the bronze seat on each side. The first movement of the screw in opening releases the wedge action and permits both parts of the gate to move freely.

Machining of parts *A* and *B* is simple and effective. After the plain surfaces or backs are machined, the wedges are milled as shown in Figs. 2 and 3. The interesting feature is that the same cutters are used in both operations so that the angles of the wedges are sure to be the same. The milling cutters are kept in pairs and reversed for the two operations. These surfaces are finished on a vertical spindle grinder as seen in Figs. 4 and 5. The proper angles are maintained by use of the same angle block on the grinder table. Both surfaces are ground with the same wheel.

There are also interesting methods used in machining the valve body. It is cast with a rectangular hole as shown roughly in Fig. 6. This opening is broached from the rough with a pull broach. Proper self-alignment is secured by using the ball joint abutment at *A*. The piece next to the valve body adjusts itself to the bottom of the body casting and aligns it with the cored hole.

The broached hole is then used to hold and position the valve body for facing and tapping the ends as shown in Fig. 7. No chucking or clamping is necessary since the body is slipped over a rectangular upright *A*, which is a good sliding fit in the broached hole. Held in this way under a vertical heavy-duty drilling machine, both ends of the body are counterbored, faced and tapped. This method of holding the



Gates for high-pressure oil valves are machined with special milling cutters and finished on vertical-spindle grinders. The valve bodies are held in special fixtures for broaching, drilling, tapping and several assembly operations

body greatly simplifies the operation and makes rapid production an easy matter.

The bodies next go to turret lathes where they are held in special fixtures for boring, facing and counterboring the inlet and outlet openings. These fixtures also locate the valve bodies from the central broached surfaces and make chucking an easy and rapid operation.

The counterboring is to receive the projecting end of bronze seats that fit inside the body. These seats are longer than the gate, and form a bearing for it all along its travel. These bronze seats ***A***, Fig. 8, are

forced into place by using a plate *B* with a locating pilot, pressure being applied by the ram *C* that comes through the opposite opening.

Another ingenious operation is the tightening of the bottom plug and the bonnet at the upper end of the body. This was originally done by hand with long wrenches, which slipped occasionally. The bodies are now put in a machine which holds the bottom plug of the valve which the bonnet is surrounded by a wrench opening in the center of a worm wheel. The worm operating this is driven by an electric motor. An ammeter in the motor circut shows how much current is being taken. When the current reaches a given point, the plug and bonnet have been tightened sufficiently.

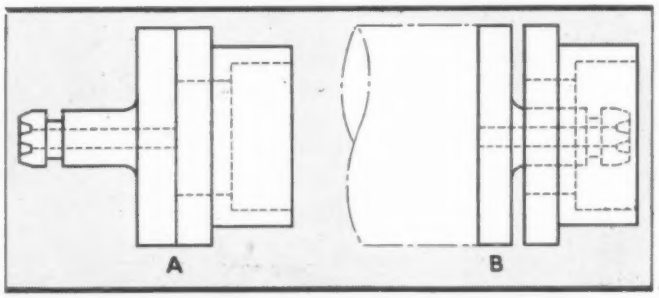
Two Turret Lathe Parts at Once

BY J. F. ALLEN
Beech Aircraft Company

An improvement in machining two aircraft parts saved both time and material at the Beech Aircraft Company. The clutch housing and flap drive for this company's all-metal advanced trainer planes form a subassembly consisting of two parts turned on a turret lathe and joined by rivets.

The parts as assembled are shown at *A*. They are made from an X4130 chrome-moly steel bar, 4-in. in diameter, on a Warner & Swasey turret lathe.

Formerly each piece was machined in a separate



A substantial saving in alloy steel used in producing the two parts shown at *A* results from machining them in a nested position as at *B*

set-up from a different bar of steel. However, the set-up man on this job noticed that whereas the clutch housing had a large hole in it, necessitating the removal of considerable waste steel from the bore, the flap drive had a great deal of stock removed from the outside. He hit upon the idea of machining both pieces at once from the same bar of steel. The sketch at *B* shows how the two pieces were set-up in the machine and cut from one bar.

Actually three set-ups are required. With the bar positioned as at *B* the parts are turned and faced. The recess is finished for the outer part but left rough for the flap drive; and the hole is rough drilled. Both pieces are cut off as one unit, that is, back of the second piece.

In the second set-up, with the work chucked from the opposite end the back is faced, the hole is finish drilled and reamed, and the two pieces are parted by cutting between them into the recess.

A third turret lathe set-up completes the turning and facing operations on the flap drive.

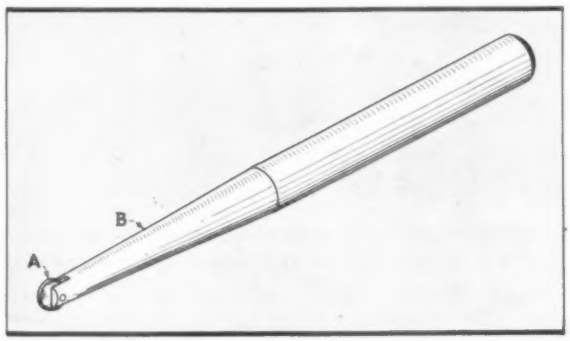
The saving in alloy steel can be readily seen. Both parts are made from a length of bar only slightly longer than that formerly needed for each part.

Countersink for Oil Holes

BY AUGUST KUEHN

Experience has indicated in some shops that oil holes are more satisfactory if they have a concave countersink. The shape of this countersink makes them hold a drop of oil better.

The countersink shown in the drawing was devised



Concave countersink in oil holes can be produced by this hardened steel roll on a tool shank

for making this type of oil hole countersink. Hardened steel roll *A* is mounted on the end of tool shank *B* on a shaft which is riveted to the shank. The roll is free to turn on this rivet. This tool is then mounted in a drill and used like an ordinary countersink.

Notes on the Use of Crossed Belts

BY JOHN E. HYLER

When using a crossed belt to turn the driven pulley counter to the driver, the pulley shafts should not be located too close together, because the resulting close twist increases the strain on the belt and subjects it to rapid wear. The wider and thicker the belt, the greater will be the strain when it is twisted or crossed between centers a given distance apart. Consequently, the wider the belt, the greater should be the distance between pulley centers. Likewise, for a constant distance between centers, large pulleys will cause a greater strain on the crossed belt than small pulleys; hence, the larger the pulleys, the greater should be the distance between centers.

These facts are useful to know when planning a crossed drive. One of the rules to follow is to double the diameter of each pulley, add the doubled diameters, and multiply the results by the cube root of the width of the belt used, and finally use this result as the minimum distance between centers. The distance may be increased any reasonable amount desired.

Mining—Number One War Industry

The mineral products of the earth are the prime necessities of war... and peace

THE SURFACE of the earth provided primitive man with the things he needed for his meager existence but civilization really began when he became curious about its interior. This curiosity has brought us a long way. For the earth has yielded — out of its deep recesses — all the raw materials of modern industry. And today, in the grueling race of production, our mining industry is providing the raw materials upon which depends our survival. Our mines and quarries must supply a long list of materials without which a successful war cannot be fought.

Take steel, for example. War without steel is inconceivable. Steel starts with iron ore, limestone and coke. These are products of mines and quarries. It takes power and heat to get these materials out of the ground, to refine them and to transport them to the point where processing begins. All the subsequent operations culminating in the steel ingot, shape or plate, and in moving the final product to the point of use require power and heat.

The major source of this power and heat is coal.

Production of a ton of steel, it has been stated, requires two tons of coal. Smelting of the pig iron alone, 60,000,000 tons in 1942, required the coking of some 75,000,000 tons of coal. Pig output is expected to rise to 68,000,000-70,000,000 tons in 1943, carrying coal consumption up to 85,000,000 tons. At the same time, output of steel ingots is expected to rise from 87,000,000 to 97,000,000 tons. Think what this means in terms of power and heat.

Another vital metal is copper. Modern armies need copper. This point is dramatically illustrated in a recent memorandum by Robert P. Patterson, Under Secretary of War, in announcing the release of 4,000 men from military service to return to the mines and increase copper production. "In a single minute of combat", Mr. Patterson declared, "a flight of 50 fighter planes shoots away 7 tons of copper. A 37-mm. anti-aircraft gun uses up a ton of copper every twenty minutes it is in operation. Six hundred pounds of copper go into every medium tank, and a ton into the engines and airframe of a Flying Fortress. The Signal Corps alone needs 5,000 tons of copper every month for radio and telegraphic and telephonic equipment. An army without copper would be an army without speed, maneuverability or firepower. It would not last a day in battle".

Seven tons of copper for one minute of combat by 50 fighter planes means from 200 to 700 tons of ore, depending upon its grade. Small wonder that the War Department was willing to release drafted miners from military duties to produce more copper.

But other metals are equally important in war: tungsten, nickel, manganese, chromium, vanadium and molybdenum for alloy steels; zinc for brass and die castings; tin for bronze and bearings; aluminum and magnesium for aircraft; lead and mercury for ammunition; silver for electrical equipment, bearings and solder, and so on. Even relatively insignificant non-metallics, like mica and diamonds, suddenly assume critical importance.

And let us not lose sight of the fact that without adequate energy, i.e., heat and power, production, processing, transportation and the relative comforts to which we have become accustomed would be impossible under war conditions. Coal is the major source of energy in the United States. It supplies more than half the total in normal years.

The railroads of the country alone used 110,000,000 tons in 1942 to move freight and passengers and service their facilities. Utilities consumed over 68,000,000 tons in the production of electric power. Over 135,000,000 tons of coal were consumed last year in maintaining the level of heating comfort necessary for the maintenance of efficiency and morale. The consumption, this year, will be even greater.

In short, the mineral products of the earth are the prime necessities of war.

The nations that control the world's mineral resources and make the most efficient use of them will win the victory.

Before the war, the British Empire and the United States together controlled probably 75 per cent of the world's mineral production. This would have been a most potent weapon in the United Nations' arsenal if the whole strategy of Axis expansion had not been influenced by mineral objectives. Addressing the American Zinc Institute on the subject last April, E. W. Pehrson, of the U. S. Bureau of Mines, estimated that the Axis had improved its position in world mineral resources in the following percentages: iron ore, from 6 to 46; steel production capacity, 20 to 34; petroleum, 1 to 7; coal, 27 to 53; copper, 5 to 10; lead, 7 to 22; zinc, 16 to 27; tin, 1 to 72; manganese, 2 to 30; chrome, 3 to 30; tungsten, 6 to 60. In the light metals, areas now Axis-controlled produced in 1940 54 per cent of the world's aluminum, 49 per cent of the bauxite (the principal source of aluminum) and two-thirds of the magnesium.

This is the eighth of a series of editorials appearing monthly in all McGraw-Hill publications, reaching more than one and one-half million readers, and in daily newspapers in New York, Chicago and Washington, D. C. They are dedicated to the purpose of telling the part that each industry is playing in the war effort and of informing the public on the magnificent war-production accomplishments of America's industries.

Despite these gains, the industrial war power of the United Nations still can outweigh that of the Axis by a considerable margin. It already has begun to surpass it. The problem is to convert quickly our potential mineral resources into implements of war. In this conversion, a heavy burden of responsibility has been placed on the mining industry of the United States as the largest producer of many metals, minerals and fuels. In fact, the United States mining industry began to go on a war basis a year before Pearl Harbor. The curves of demand for domestic copper, lead, zinc and other metals began to rise sharply in 1940, and were paralleled by a rising coal production.

How well the job has been done cannot be revealed in accurate figures in many cases because of censorship. In metals, however, some idea of production gains can be indicated in comparative terms. United States copper production, for example, is breaking all previous records. Aluminum capacity will be more than seven times its annual peace-time average. Magnesium plants now building will have a capacity 100 times the largest yearly before-the-war figure. Molybdenum, of which the United States has the largest single mine in the world, is being made available in record quantity. Zinc, lead and mercury are surpassing expectations in meeting wartime demands, and tungsten, chromium, manganese, antimony and iron and steel are being turned out in record-breaking quantities.

Bituminous coal production in 1942 was 580,000,000 tons, the greatest in history, valued at more than $1,300,000,000 at the mine. Some 430,000 or more men were employed in 1942 and received at least $750,000,000 in wages. Bituminous production in 1939 was 394,855,000 tons, while the output for 1943 is forecast at approximately 600,000,000 tons — another new United States record. The 1942 anthracite output was 59,961,000 tons, valued at over $270,000,000 at the mine. The industry employed some 85,000 men and paid out at least $180,000,000 in wages. The 1939 production of anthracite was 51,487,000 tons, and the forecast for 1943 is 65,000,000 tons or more.

Marshalling the Western Hemisphere's mineral resources, the United Nations have been the beneficiaries of the diversified resources of two continents — in particular of Canada's nickel and coal, Mexico's lead and antimony, Chile's copper, Bolivia's tin, Peru's vanadium, Brazil's iron, and Venezuela's petroleum. With other United Nations contributing their share of metals and fuel, the grand total is an impressive array of potential munitions and matériel to lend assurance of certain victory over the Axis. Sheer weight of metal, properly used, will win the war, and our mineral industry will have played an indispensable and essential part in the inevitable outcome.

James H. McGraw, Jr.

President, McGraw-Hill Publishing Company, Inc.

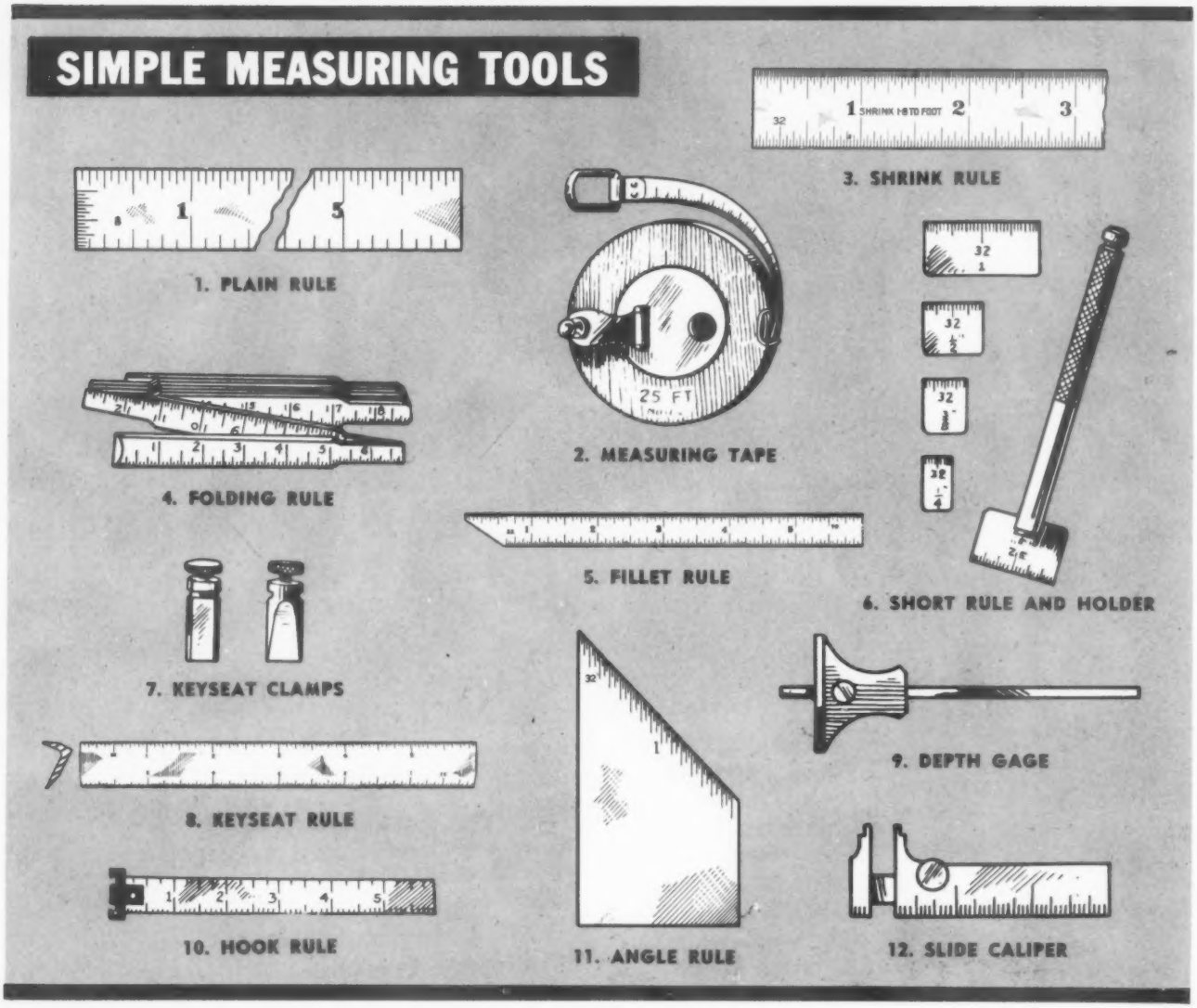
The TOOLS OF OUR TRADE

The continuing loss of shop personnel to the armed forces calls for ever faster training of new employees. To help reduce to a minimum the time for instruction, the editors of *American Machinist* have prepared a series of special sections on elementary shop practice. This, the first, is our answer to the chief obstacle to the novice's progress — the simple fact that he doesn't know the names of things. If you can use this help, reprints of this section are available from the Editor, *American Machinist*, 330 West 42 Street, New York, N. Y., at 10 cents a copy.

ON ENTERING A MACHINE SHOP, the new worker, fresh from school, a sales job, the farm, or the household, finds himself in strange and confusing surroundings. In order to find his way about he will have to learn the names of a bewildering array of unfamiliar gadgets. Some of the tools he will encounter will be much like those he has used before coming into the shop – at some time most adults find a use for a screwdriver or hammer, for example – but many of these new tools will be like nothing he has seen before.

Recognizing the need for quickly teaching the beginner his way about the shop, the editors of AMERICAN MACHINIST have prepared the following picture book of the common machine shop tools. In it pictures of tools of a similar type or those used in similar operations are grouped together. Thus various simple measuring tools are gathered in one block while rotating cutting tools are gathered in another. Each picture has the common name for the tool printed under it and all are numbered consecutively from the front of the section to the back. On the last page of the section, the beginner will find an index where both the common and catalog names of each tool are given with the number of the picture to which he should refer. In this way the trainee can look up any tool name which he may meet in his work, and flip quickly to an illustration and discussion of it.

Accompanying each block of pictures is a description of the illustrated tool, as well as further information about its size, uses, range, and special types. The beginner should read this text completely at first, examining the pictures of each set of tools and then learning what else he can from the printed word. In this way he should get an idea, not only of the outlines of the tool, but of its size and proportions. Since the trainee will remember the tool better if he knows what it is used for, a brief summary of the uses of each type of device is included.



Simple Measuring Tools

Rules, or scales, are the simplest measuring tools. The types used by the machinist may vary in size from the ¼-in. rule, used with a holder to measure in narrow spaces, to steel tapes 150 ft. long. The commonest machine shop scale is the 6- or 9-in. plain steel rule, which is used for all general, non-precise measuring. The plain rule often has gradations across one end which is used like the short rule or for combining length and height measurements.

Special types of rules have been developed for special purposes. For example, the end piece on a hook rule is placed over a hidden surface to line up the zero mark exactly. Special shrink rules are made so that what appears to be an ordinary 12-in. scale is actually larger. These are used in making patterns for castings which will shrink at a known rate when they cool. The fillet rule is made with one corner cut away to measure over a rounded internal corner. The keyseat rule is used with keyseat clamps to scribe lines along cylindrical pieces, as in laying out keyseat slots. The angle rule is a convenient tool for measuring pieces in a lathe. The gradations are on the 45-deg. edge but they measure perpendicular distances from the long edge.

The depth gage and slide caliper are other adaptations of the scale. In the depth gage a square jaw slides on the rule and furnishes an edge from which to measure relative heights and depths. The caliper rule has jaws which open and close to give the external or internal dimensions of a piece.

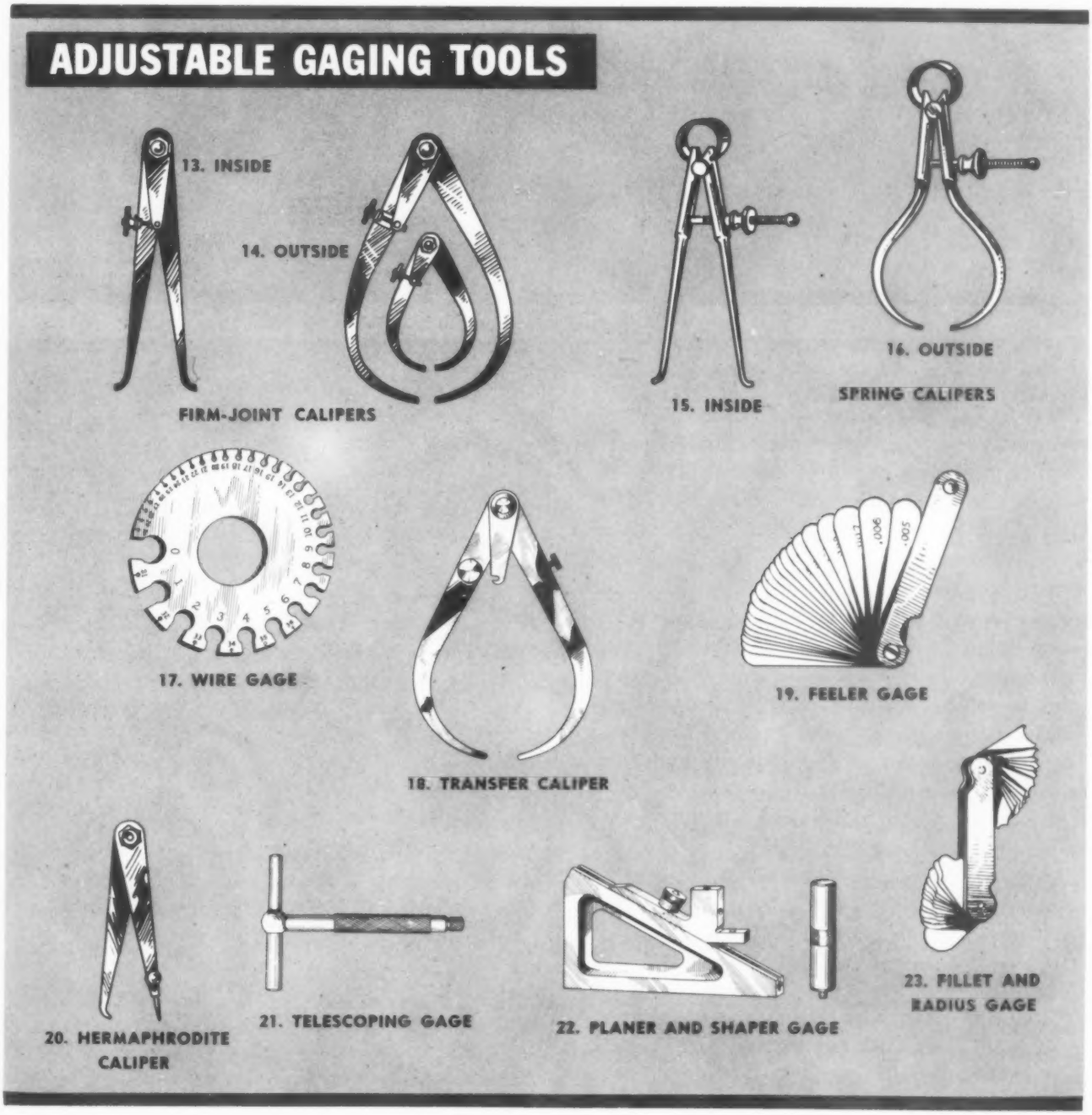
Adjustable Gaging Tools

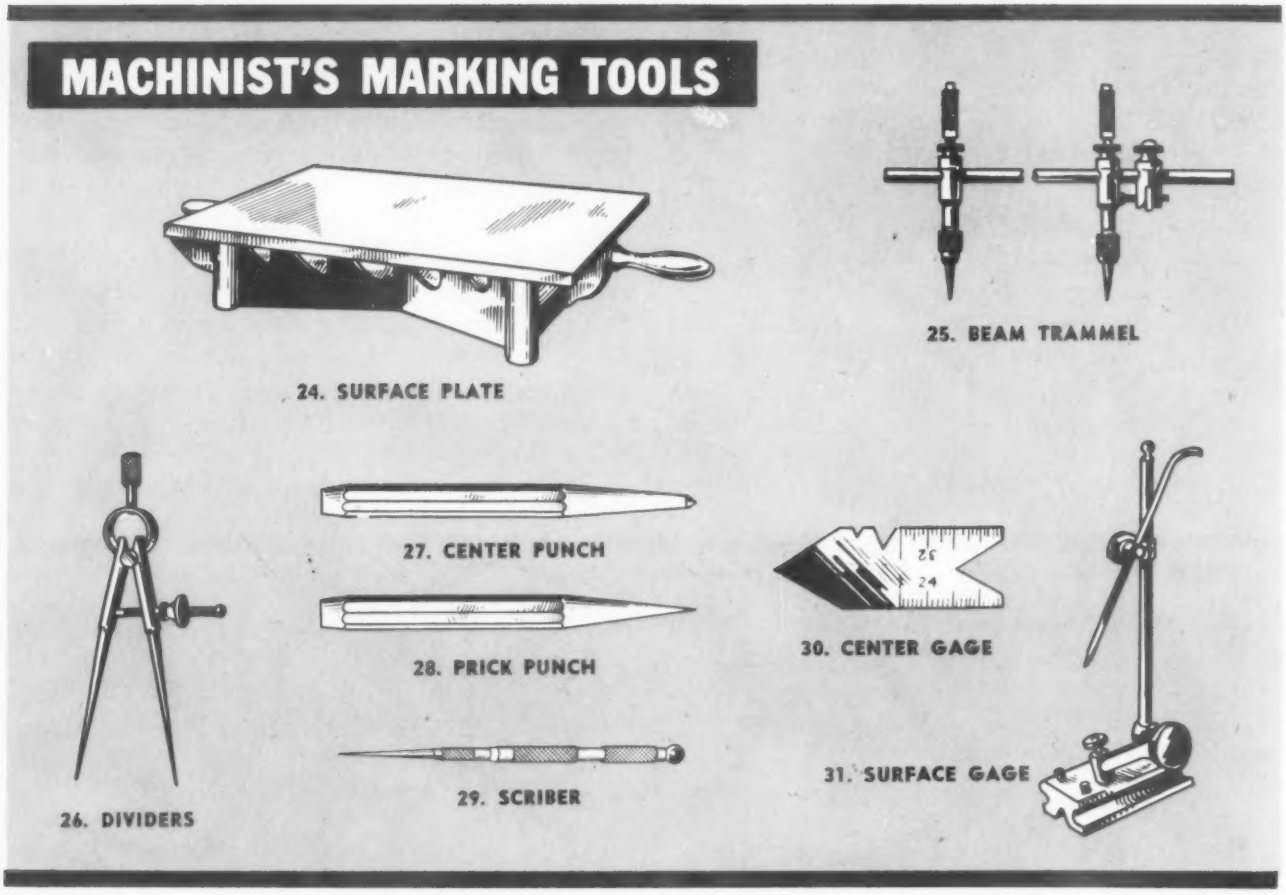
The tools in this group can be set at any dimension and used to transfer dimensions from a part to a scale. The legs of outside calipers are designed to fit over or around the piece; inside caliper legs to fit

into recessed parts. The spring types range in size from 2½ to 8 in.; the firm-joint types from 4 to 24 in. Spring calipers are easier to adjust but they are not adaptable to large sizes. Transfer calipers are used where it is necessary to change the setting of the caliper in order to remove it from the piece. The locating piece preserves the dimension while the tool is removed. All types of calipers can be used as inspection gages for small lot jobs.

A telescoping gage can be used in much the same manner as an inside caliper. The slender arm of the crossbar slides in and out of the thicker arm against the pressure of a spring. The arms are locked at the required dimension by a screw in the handle.

A wire gage is used to determine the thickness of various types of wire; the largest slot through which the wire will pass gives the size. Similar gages are made to determine drill, screw and sheet metal sizes. Feeler gages are made of a number of pieces of thin metal gathered together. They are used to determine the width of narrow spaces between pieces, as between a bearing and a shaft. Fillet and radius gages are used to check rounded parts against pieces of known curvature. The planer and shaper gage is used to set the tools on these machines when they are being used to make angular cuts. The angle of the cut is determined by the slope of the inclined plane of the tool.

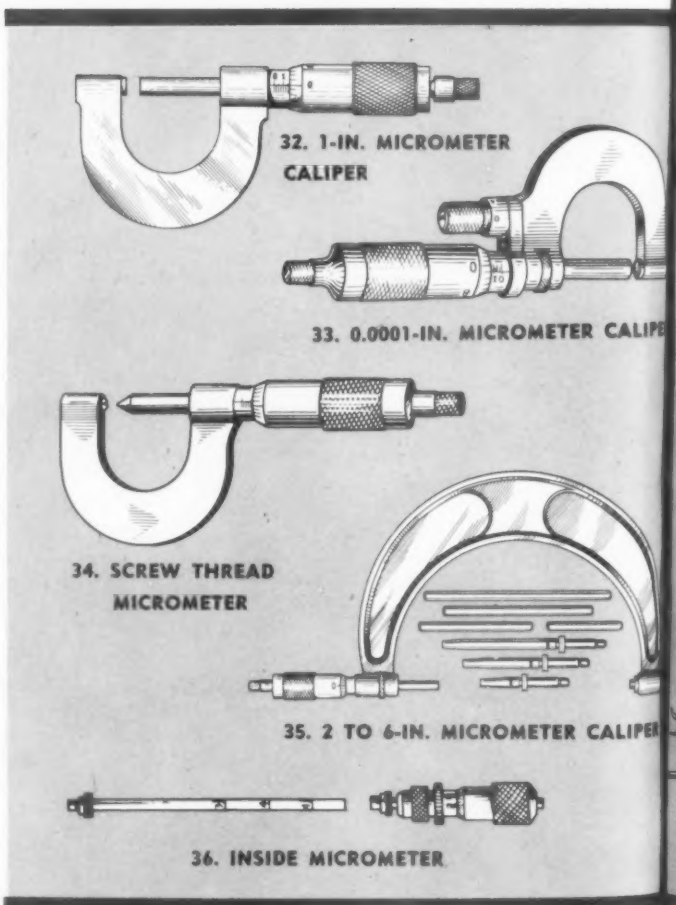




Machinist's Marking Tools

Marking tools are used to indicate the size, form and locating points on a part in preparing it for a machine operation. This work is called "laying out." It is usually done on a surface plate, a smoothly machined, level metal surface. After the work has been coated with chalk or a marking dye such as prussian blue, whatever lines may be necessary are drawn on the metal with a scriber. Where curved lines are necessary they are drawn with dividers, which are also used to transfer or step off dimensions. A beam trammel, or universal divider, is used for dimensions beyond the span of an ordinary divider. It is often supplied with special points. The hermaphrodite (often mispronounced "morphodite") caliper is a handy tool for scribing lines parallel to a surface. The center gage is used to find the center of round stock or to check 60-deg. angles, such as the points of threading tools.

The surface gage is one of the most versatile tools in the machinist's kit. It is used to transfer accurate measurements from a master gage to the workpiece, to scribe lines parallel to a surface, or as a gage in comparing the relative position of points in all sorts of layout operations.


32. 1-IN. MICROMETER CALIPER
33. 0.0001-IN. MICROMETER CALIPE
34. SCREW THREAD MICROMETER
35. 2 TO 6-IN. MICROMETER CALIPER
36. INSIDE MICROMETER

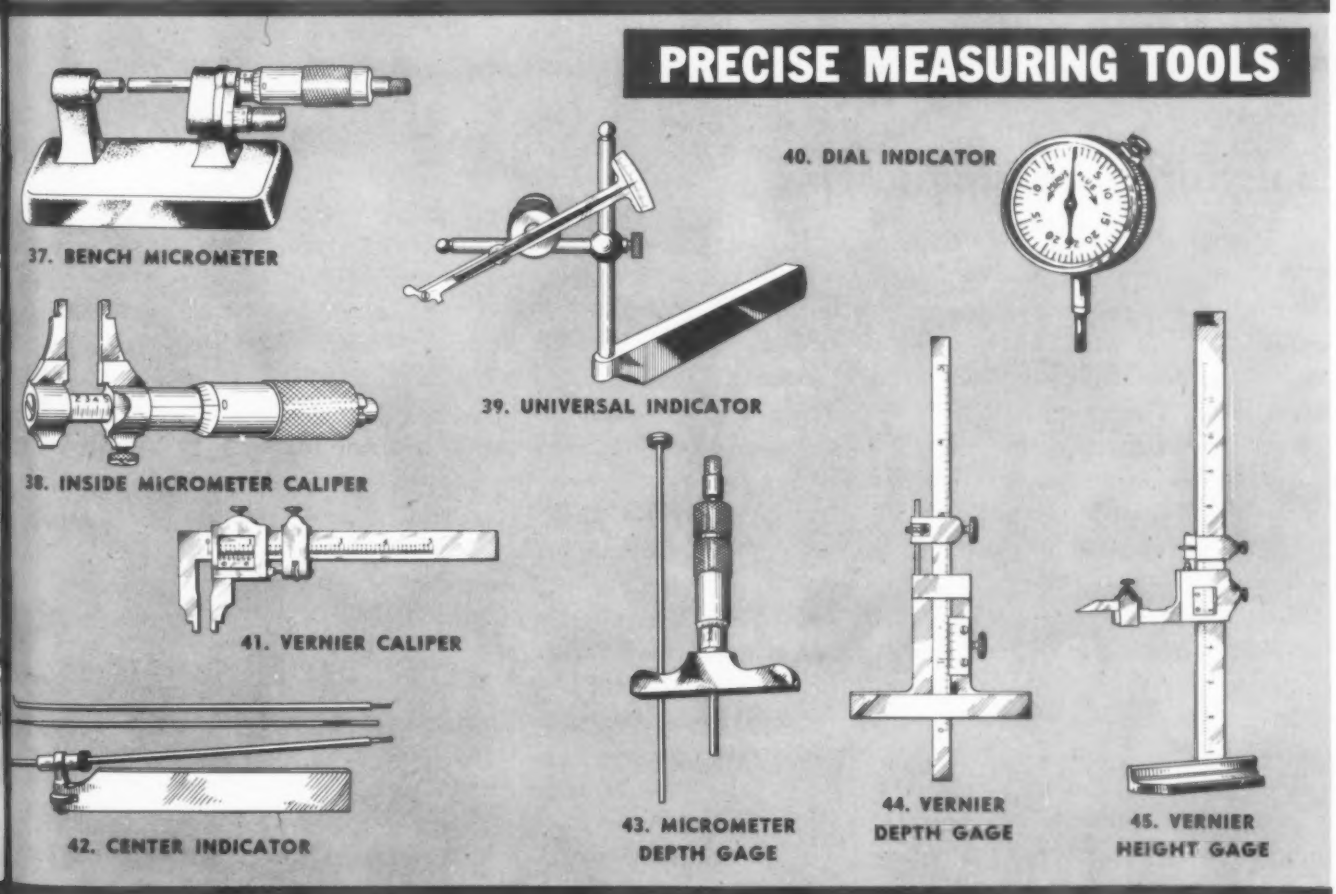
Precise Measuring Tools

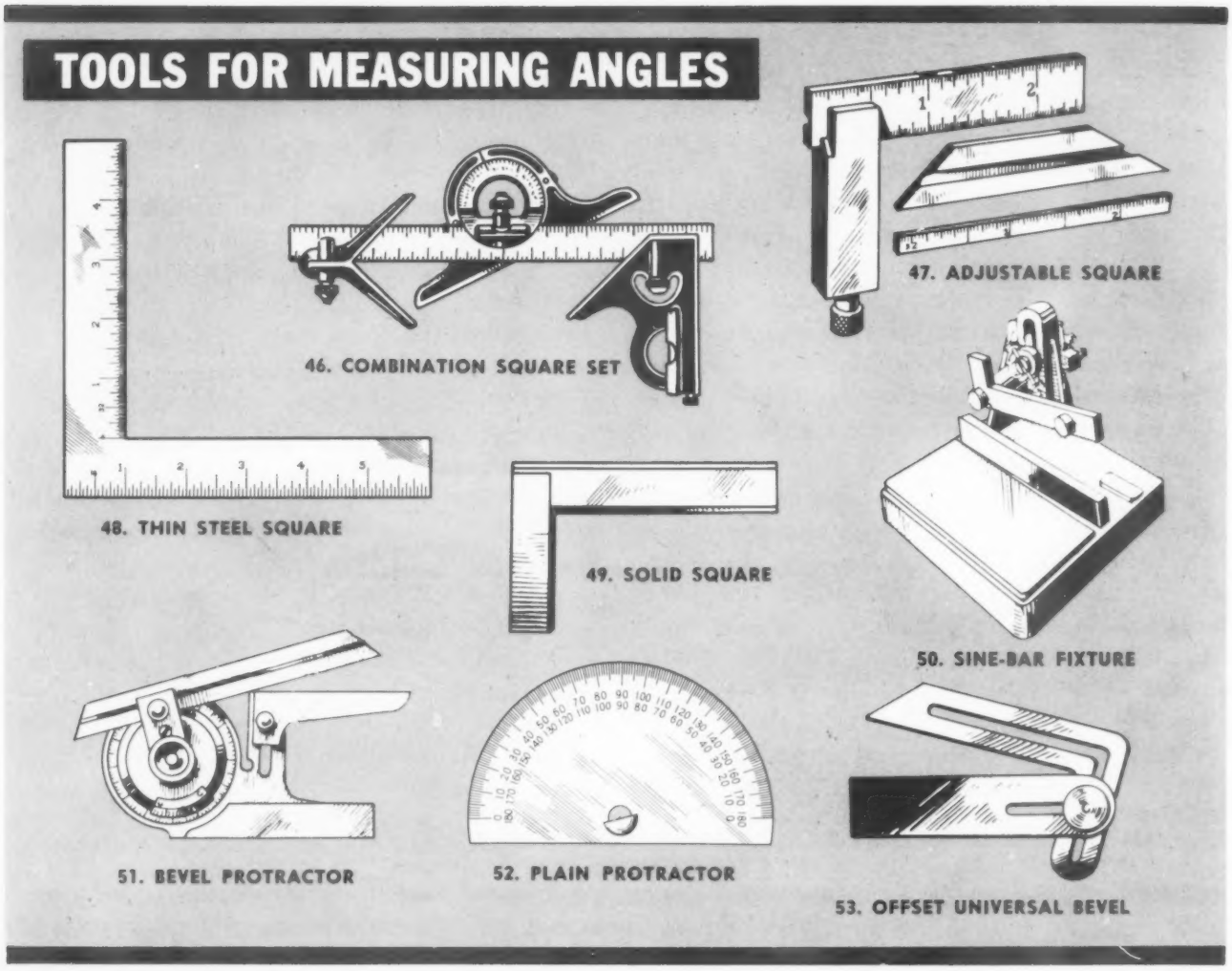
The vernier system is one method of attaining fine measurement. It is based on the fact that if two scales are divided so that ten parts on one equal nine parts on a second, then the difference in size between the respective parts will be 1/10 of the larger part. Thus on a scale reading to 0.01 in., the addition of a vernier scale will give a reading of 0.001 in. Vernier scales are used in several instruments: in one 0.0001-in. micrometer, and in vernier calipers, height and depth gages. On a bevel protractor, a vernier scale is used to give readings to 1/12 of one degree. Vernier scales may also be combined into special tools for special purposes.

The fact that a screw having 40 threads per inch will advance 0.025 in. for each revolution is the basis of operation of the standard machinist's precision measuring tool, the micrometer. When the spindle of the screw is divided into 25 parts, each part will indicate a movement of 0.001 in. Supplementary spindles and vernier scales make possible micrometer readings of 0.0001 in.

Micrometers are available in many forms for many applications. The ordinary machinist's "mike" measures from 0 to 1 in., but types are regularly supplied which measure up to 12 in., and special types are made much larger. The micrometer principle is used in outside and inside calipers, height and depth gages, and in special tools. In the illustration, note the difference between an inside micrometer and an inside micrometer caliper. The first has a greater range, but the second is handier and will measure smaller dimensions. The measuring surfaces, or anvils, of a micrometer are varied to suit particular jobs. They may be made very wide for measuring soft substances like paper, or ground to exact shapes such as the illustrated screw thread "mike." Large micrometers are often supplied with a set of anvils to extend their range as shown in the 2- to 6-in. size.

Minute variations in size are shown by several sorts of indicators, most of which are arrangements of levers to magnify the movement of a point which rests against the work. The dial type is easier to read, but the universal type is simpler in construction. The center indicator is used to make sure that centers are running true in a lathe. Indicators are chiefly used to test machine set-ups before a job is run, but they may also be used as inspection gages to check parts.





Tools for Measuring Angles

A number of the machinist's common angle-measuring tools go to make up the combination square set. This includes a center head, a protractor and a square, all mounted on a heavy steel scale. The center head is used for finding and checking the centers of round pieces. The protractor gives angles of any degree to the horizontal of the rule. Besides checking squareness, the square may contain a bubble level for truing-up horizontal parts. With this variety of functions, the combination square makes an especially versatile tool.

Squares, which come in a variety of forms, are used to measure right angles and to check perpendicularity. The plain square illustrated has a knife edge which makes it particularly valuable for testing the flatness of surfaces. The adjustable square has a number of blades, making it adaptable to a variety of jobs. The thin steel square is used where gradations on two arms are required or where a larger square is advisable.

The various forms of protractors, all of which are variations of the common protractor — a simple arc, usually 180 deg., marked off in degrees or fractions of a degree. These tools are used to measure angles other than the fixed ones of 30, 45, and 60 deg. The bevel protractor, which combines two straightedges with a 360-deg. protractor, is the handiest for the machinist's use. It is used to layout and measure accurately interior or exterior angles. With a vernier scale it will indicate 1/12 deg.

Universal bevels may be set with a protractor and then used to layout workpieces or as a gage to check angles. They are made with straight or offset arms. The offset type illustrated is useful for working in small spaces.

A sine bar is an accurately machined bar which is set by the use of precise measuring tools at the exact angle required. It is commonly used in the form of the illustrated fixture. It may either measure an unknown angle, which is then computed by trigonometry, or it may be set at a given angle and used for layout or as a gage.

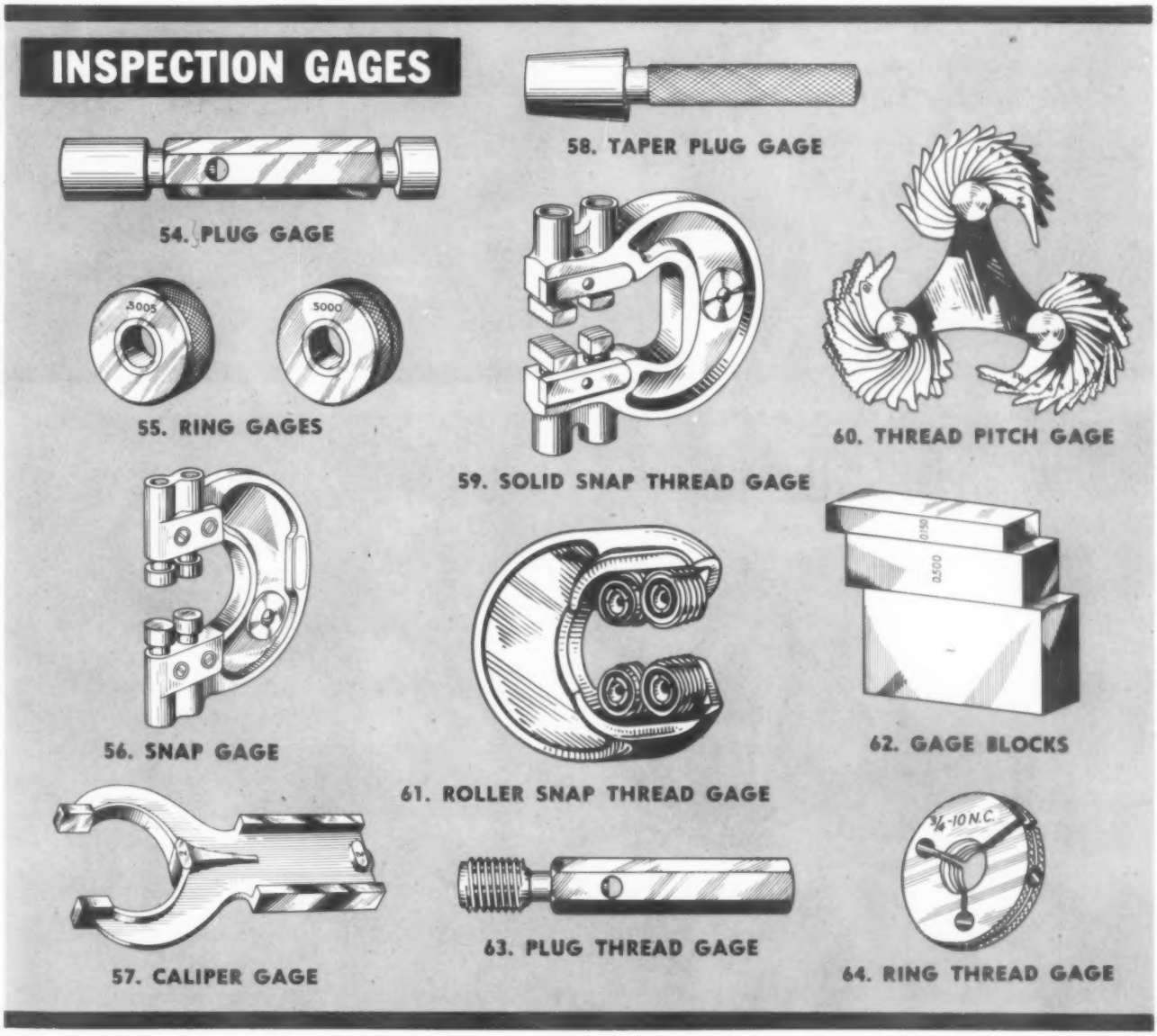
Inspection Gages

Many parts are inspected by checking them against pieces of known dimension called inspection gages. These gages are available in a wide range of shapes and in sizes up to a foot in diameter. Inspection gages are usually supplied in "go" and "not go" form; a pair of gages will check both the upper and lower limits of the dimension. Standard sets of gages are made for common dimensions, and special sets are made up for particular jobs.

The shape to be checked determines the gage to be used. The caliper gage is used like a caliper to check the internal or external dimensions of rectangular pieces. Ring gages are used to check the outside dimensions of cylindrical forms; plug gages are used to inspect internal cylinders. Snap gages may be used on the outside dimensions of either cylindrical or rectangular pieces. Most of the gages pictured are in "go" and "not go" form. In this form the piece must pass the "go" part but not the "not go" part.

The common forms of inspection gages have been adapted to the task of checking screw threads. Screw thread gages are found in ring, plug and snap form. These check screw threads completely in one operation. For quickly finding the number of threads per inch in a screw, the pitch gage is used.

Gage blocks are among the most accurately machined tools yet developed, being finished to 0.000002 in. Their surfaces are so smooth that when pressed together, they will stick to each other. Sets of blocks number 5 to 102 pieces and may range from 0.10 in. to several inches in size. These pieces may be combined to give any dimension within the range of the total number of blocks. They can be adapted to many different inspection jobs.



Holding Tools for Hand Work

Wrenches come in many shapes, of which the illustrated forms are typical. Open-end wrenches are made with openings of from 5/16 in. to 5 in., but shop sizes do not run much over 1 in. The S-form is more convenient to use and both open-end and adjustable wrenches are made in it. Socket wrenches are made with square or hexagonal openings up to 2½ in. wide. The T-handle type can be used with one hand, but more leverage is obtained with the offset handle. The ratchet type is used for quick, light operations. Adjustable, or "Stilson," pipe wrenches will handle pipe up to 3½ in. in diameter; sizes up to 18 in. are handled with the chain type.

Pliers are also varied in form. The three illustrated are common types, but nose styles occur in many widths, lengths and shapes for special uses. The slip-joint or "gas" plier may be used with the joining pin in two positions, one for a tight grip and one for a wide spread. Heavy-duty or "bulldog" side-cutting pliers are used where great strength is required. This is a favorite style with electricians, the side cutter being useful in wire cutting and stripping. Needle-nose pliers are used for a variety of small jobs.

The machinists's screwdriver is usually sturdier and occurs in wider variety than the household tool. The ratchet type gives quick, easy action; it is not removed from the screwhead. The offset screwdriver is used in close quarters.

Pin vises supply handles for small parts and tools. They consist of a solid section and a small chuck head. They are made in sizes to hold pieces ranging from 0.04 to 0.2 in.

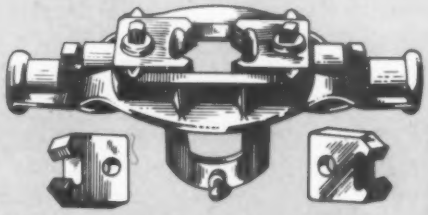
Two forms of wrenches are used to hold hand taps, the bar and T-handle types. Both may also be used to hold reamers, drills or tools with shank diameters up to ¼ in. The T-handle type has the

68. ADJUSTABLE PIPE WRENCH

72. CHAIN PIPE WRENCH

75. ROUND DIESTOCK

79. SPANNER



86. ADJUSTABLE DIESTOCK

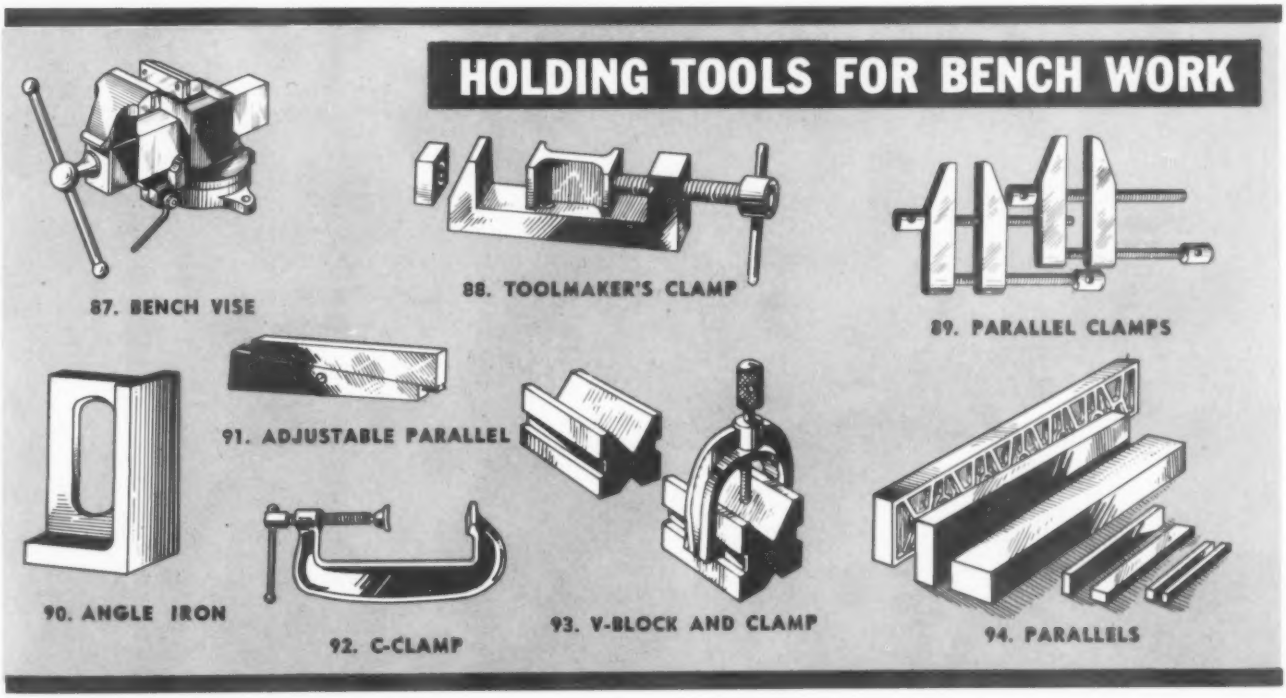
advantage that it can be used with one hand. Dies are held in die stocks for hand operations. The round type takes round split dies up to 1½ in. The two-jaw adjustable type takes larger sizes.

Holding Tools for Bench Work

A machinist's vise is fastened to the bench to hold stock or parts for hand work. The jaws are usually parallel but the back one is sometimes made adjustable. The back jaw is fastened to the base; the front jaw moves back and forth on a heavy screw. Most vises are equipped with rough toothed steel jaws for holding rough pieces and smooth soft-metal jaws for holding pieces that must not be marred. In high production work, special jaws are sometimes made to hold particular shapes. Standard jaws may vary in width from 2 in. to one foot.

Parallels are blocks used to support work in a vise, on a surface plate or on a machine table. They are made to varying degrees of exactness; in some cases they are accurate enough for careful layout use. The simplest form is a plain steel bar. In larger sizes they may be hollow or cast with a thin center section. A useful special type is made of two interlocking inclined planes. By sliding one plane over the other this parallel can be adjusted to any height within its range and can be held at this adjustment by a locking screw. The smallest size has a range from ⅜ to ½ in.; the largest, 1¾ to 2¼ in.

One of the simplest types of holding device is the



C-clamp. This consists of a C-shaped forging with a single screw through one arm. These clamps vary in the width between holding surfaces, the depth between the screw and the back of the frame, and in the weight of construction. The opening may be as small as ¾ in. or as large as 18 in.; a depth as small as ¾ in. or as large as 6 in. C-clamps are used wherever the span of the clamp will take the part without interfering with the use of the machine.

Where work must be held in parallel jaws, a parallel clamp is used. The clamp is drawn up to size with the center screw and tightened to grip with the end one. The size of the jaws varies from about 1½ in. to 12 in., the opening from ¾ in. to 8 in. Where pieces must be clamped exactly, a toolmaker's clamp, which is really a small vise, is used. These clamps have two movable jaws, a large block and a thin one, which give a jaw opening of 2 in.

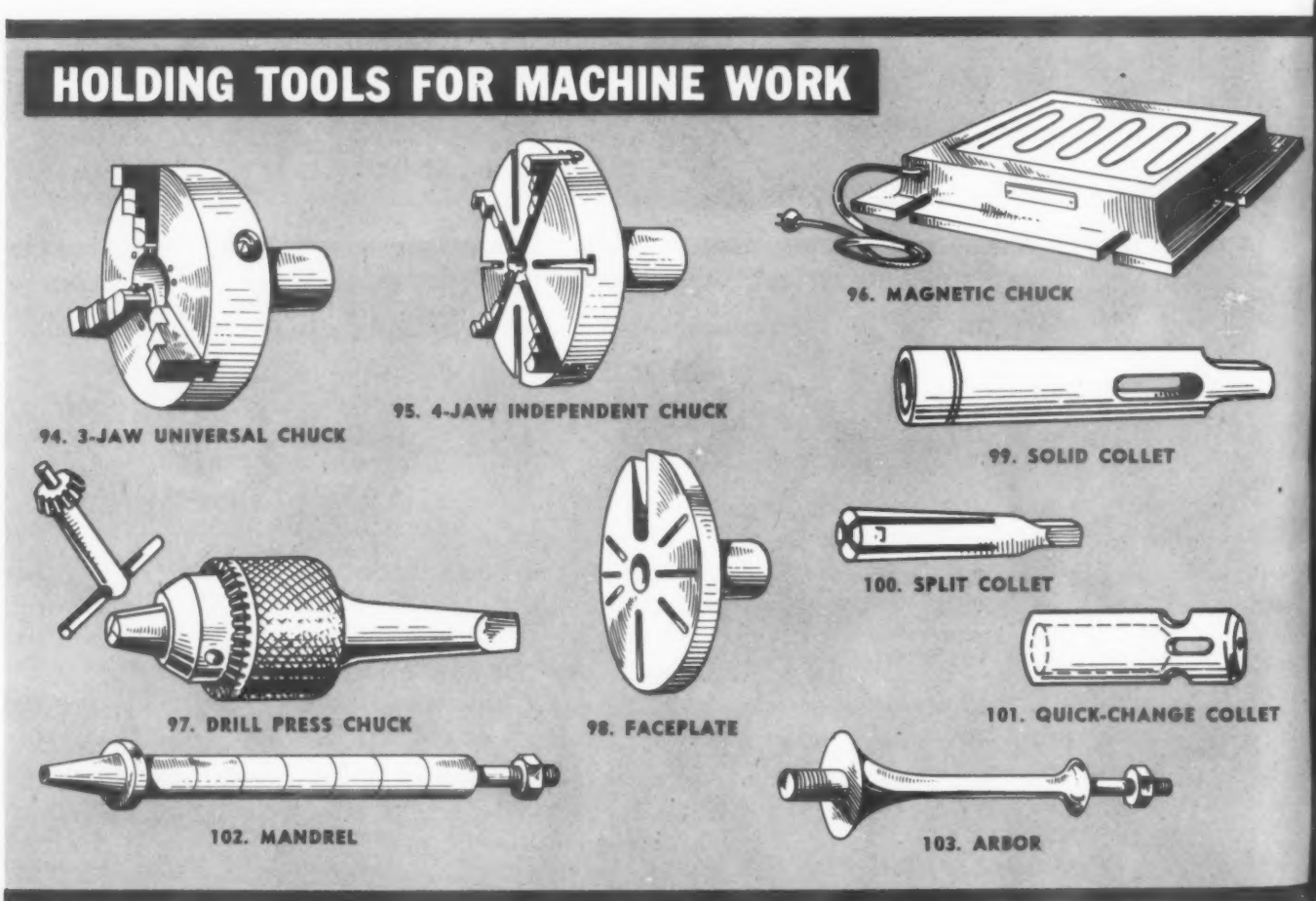
Angle irons are used as perpendicular surfaces to which pieces may be clamped. They may be used on machine tables or lathe faceplates as well as at the bench. They vary in size from a few inches to a foot or over.

The V-block is used to hold cylindrical pieces for layout, drilling, centering, etc. The sides of the V make an included angle of 90 deg. The piece may be rested in the V for layout work or clamped in for machining. V-blocks are often used in pairs to take care of longer pieces. The usual V-block will take pieces up to 2½ in. in diameter.

Holding Tools for Machine Work

A chuck is usually a device for holding rotating work or tools, from 1/64-in. drills to pieces 18 in. in diameter. The usual drill press chuck will hold circular pieces up to 1 in. in diameter. Larger pieces are held in three- and four-jawed chucks. These are of two types, the independent and universal. The jaws of independent chucks move separately and may be used to hold non-cylindrical pieces. The jaws of universal chucks are controlled by a single screw; they are quicker to use but not so convenient for non-cylindrical work. Four-jaw chucks are usually independent in operation, three-jaw chucks work from a single screw.

The magnetic chuck is not used to hold rotating pieces. It is an electric magnet with a flat, smoothly machined face on which exact work can be held on



grinders, milling machines, and other machines having a flat table.

Rotating pieces that cannot be held in a chuck are clamped to a faceplate, a round slotted plate that screws on the driving shaft of a lathe. Faceplates are also used to drive cylindrical parts. A lathe dog is clamped on the piece and engaged in the faceplate. A small driving faceplate 5 or 6 in. in diameter and a larger one up to 12 in. in diameter are the usual sizes found in the machine shop. In heavy industries faceplates having diameters as large as 5 or 6 ft. are used.

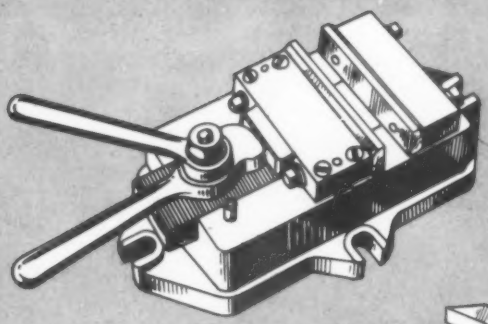
Lathe dogs are clamps for holding round pieces in a lathe, grinder, or milling machine. They consist of a clamp section which holds the piece and a projection or tail which fits into the driving faceplate. Lathe dogs in ordinary use have a capacity of ¼ in. to 8 in.

Collets serve as chucks to hold small cylindrical tools and pieces in the spindles of lathes, drill presses and milling machines. They are made in specific sizes and in a large variety of forms. The illustrated types are three simple ones. The solid type is used to hold small taper-shank drills in large spindles. The split type holds taps by clamping the tap head in the split section. The quick-change type is used in production work.

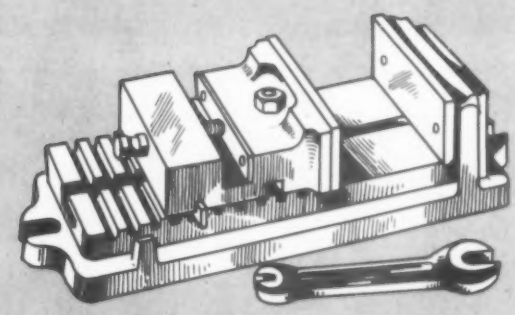
Arbors and mandrels are supplementary shafts on which work or tools are mounted. An arbor is used to hold tools, a mandrel to hold workpieces. The mandrel illustrated is typical of a great many arbors and mandrels; the pictured arbor is a special type for extending grinder shafts to hold large thin grinding wheels. A common lathe mandrel is a finely finished cylinder having a slight taper on which the work is forced until it binds. The size of arbors and mandrels varies greatly with the application.

Machine vises are used to hold irregular pieces on all sorts of machines. A number of types are made which can be clamped to the machine table. The swivel base saves time in making angular cuts. The quick-change vise is used where pieces must be inserted and removed rapidly.

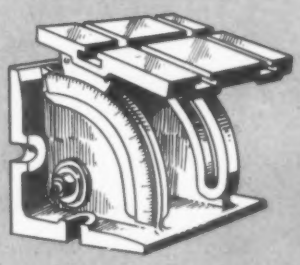
The toolmaker's knee, or adjustable angle plate, is a convenient device for holding work at an angle in a vertical plane. The work is clamped on the slotted plate and the angle is set by means of a scale marked off in degrees. An adjustment of 90 deg. makes possible any angular setting within a limit of 180 deg.



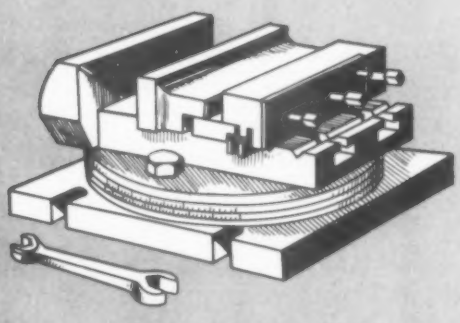
104. QUICK-ACTING MACHINE VISE



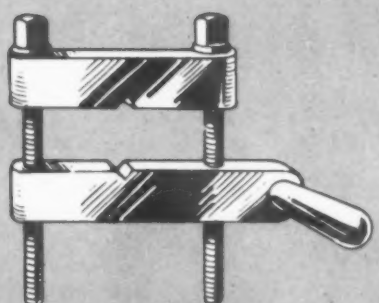
105. MILLING MACHINE VISE



106. TOOLMAKER'S KNEE

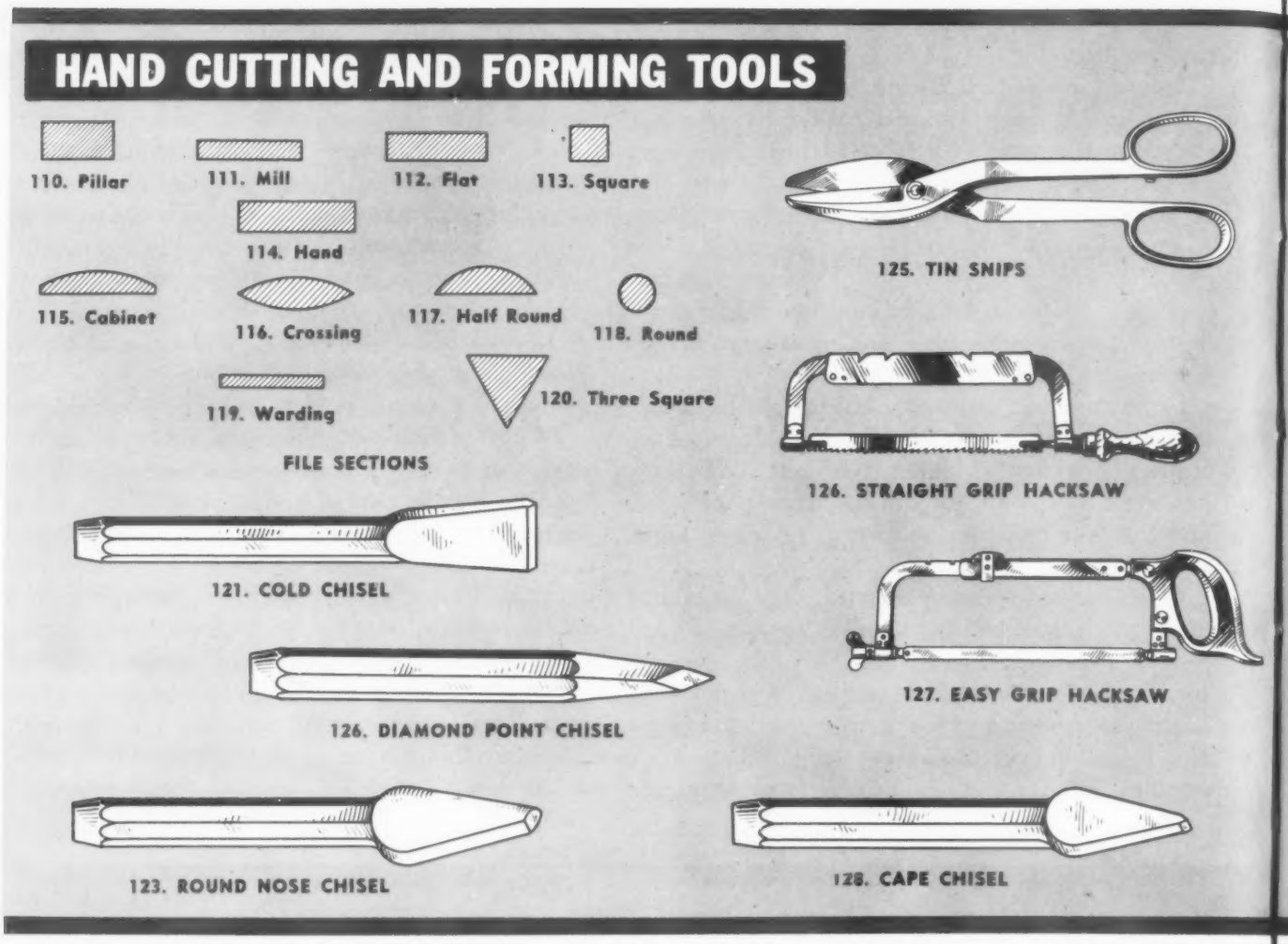


109. SWIVEL BASE VISE



107. PARALLEL CLAMP DOG

108. SOLID LATHE DOG



Hand Cutting and Forming Tools

Files are used to remove small amounts of metal to produce a smooth surface. The variety of shapes in one size is shown. Within each size they grade from coarse through bastard, second cut, and smooth to dead smooth. Each of these names is relative, representing a different grade for each size. Files may be single or double cut, that is, the teeth may be cut in one direction or two. Most machine shop files are double cut except the mill file, a type used in lathe work. Hand and pillar files have one smooth, or "safe", edge. The other styles are adapted to shaped surfaces.

Chisels are struck with a hammer to chip metal from a piece. A cold chisel is used to chip flat surfaces or cut thin metal. The cape chisel fits into narrow slots. V-shaped grooves are cut with a diamond point tool and curved surfaces by the round nose type.

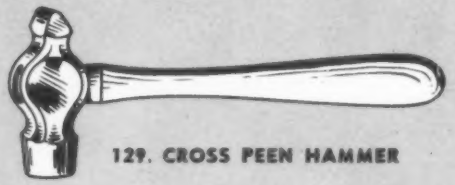
Scrapers are hand cutting tools used to finish smooth, flat or curved surfaces. Square ends are used on flat surfaces; curved forms for bearings. The three-cornered shape is used to remove burrs.

The hacksaw is the common metal-sawing tool. The highly tempered blade fits a shallow U-shaped frame and is cheaply and easily replaced. Hacksaws are made in 8- and 12-in. sizes. Some frames will take both sizes. The choice of handle style is a matter of preference.

Tin snips are the shopman's version of household shears. They are heavier made and more highly tempered as they are used to cut light metal. Types for use in cutting curved forms have curved blades. In size they vary from about 6 in. to 18 in. overall and have blades 2 to 5 in. long.

The machinist's hammer usually has one ball-shaped hammering surface or peen. Other types with straight or cross peens are used in forming operations. Since a hammer blow can do much harm, soft-head hammers are used where work might be marred. These are made of copper, lead, fiber, or rubber. Machinists' hammers run from 6 oz. to 2½ lb., but the commonest size is about one pound.

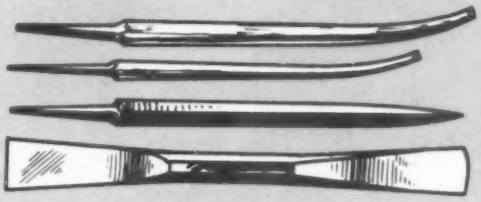
124. SOFT-HEAD HAMMER



129. CROSS PEEN HAMMER

130. STRAIGHT PEEN HAMMER

131. BALL PEEN HAMMER



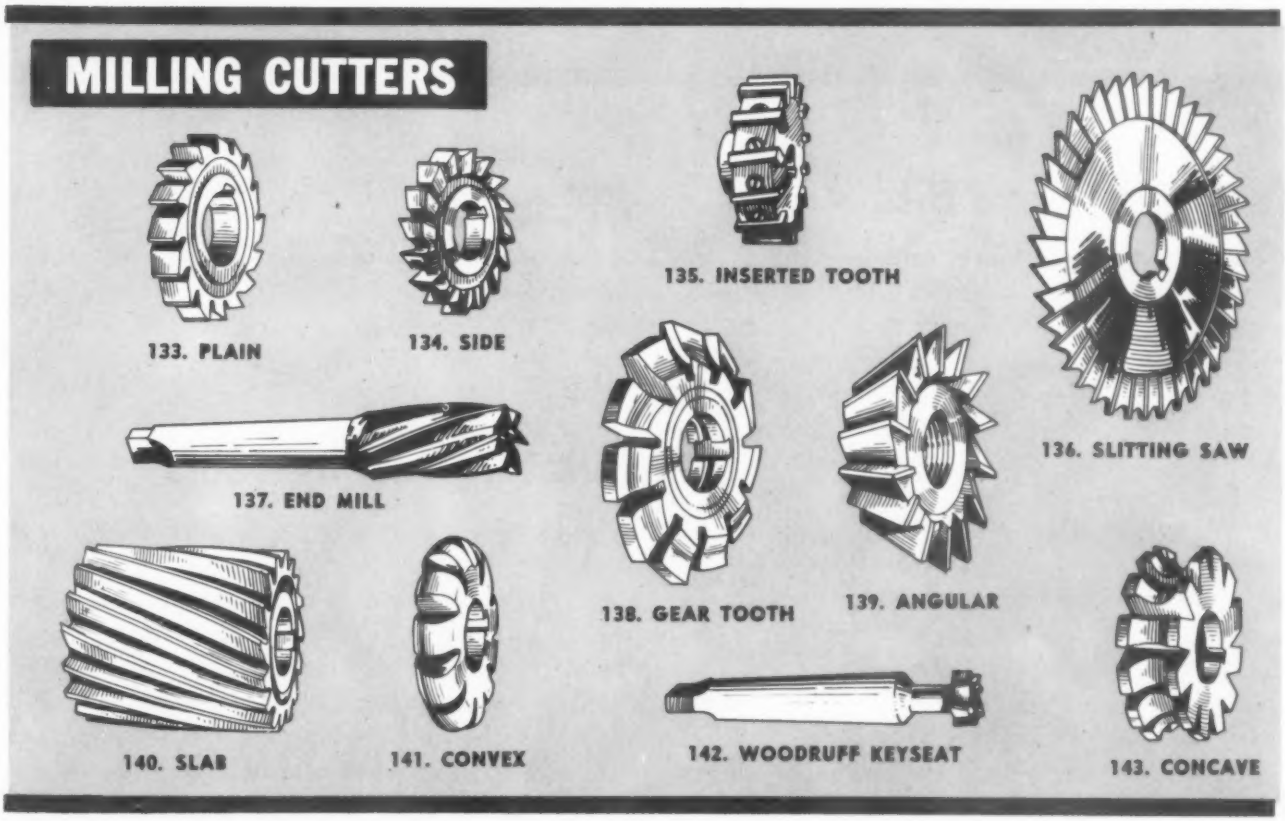
132. SCRAPERS

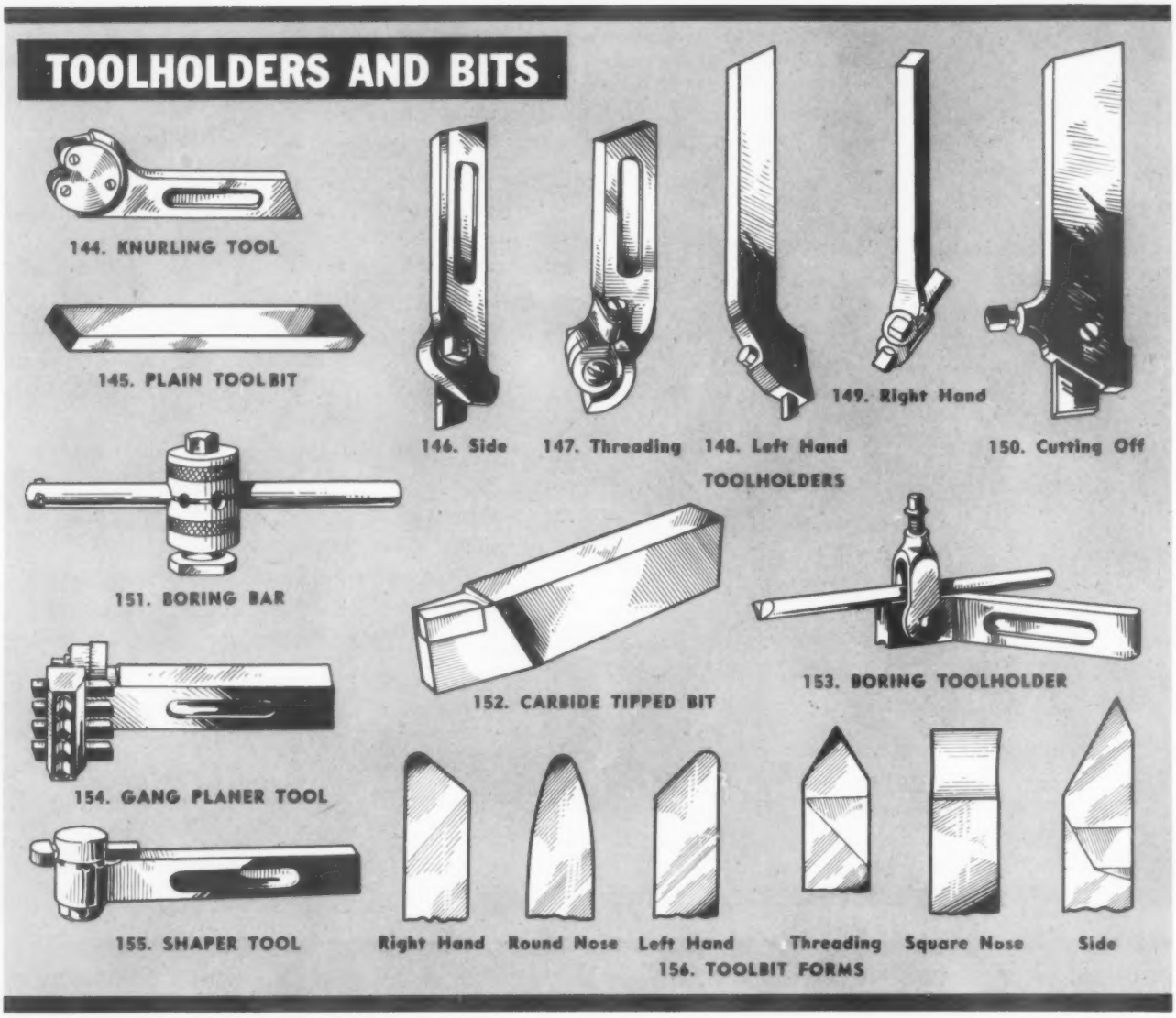
Milling Cutters

Milling cutters are made in an almost unlimited variety of shapes, often being specially designed for a job. However, certain forms are typical and these are illustrated.

Plain cutters are carefully ground to precise widths and used to cut slots of specified sizes. Slab cutters are used to mill broad areas. Holes of irregular shape are frequently cut with end mills. Side cutters cut on the outer edges and both sides. They give a finer finish. Slitting saws are used to cut narrow slits or as saws to separate parts. Gear teeth are cut with specially formed tools which are made to certain standards of size and shape, and other form tools such as the concave and convex cutters are regularly manufactured. The keyseat cutter mills semicircular slots in shafts which hold half-round metal keys. Most types of milling cutters are made in inserted tooth form so that the cutting edges are replaceable. For high speed work these replaceable edges are often made of very hard, brittle materials such as tungsten carbide.

The overall dimensions of milling cutters do not cover a wide range. They may be as wide as 8 in. or as small as 2 in. Slab cutters may be as large as 4½ in. in diameter and 12 in. wide. Several cutters may be used as a gang.





Toolholders and Bits

In lathe, planer and shaper work, the cutting tools are usually special tool steel bits held in forged toolholders. The bit is ground to fit the job in hand. The straight toolholder with a properly ground bit may be used in many applications, but special holders are made for each type of operation. Right- and left-hand tools cut along the surface toward the right and left side respectively. Side tools are used to cut end surfaces. Cutting-off tools are used to cut deep narrow slots or to cut the part from the stock. Knurling tools are used to produce a rough gripping surface. Threading tools are ground to the exact thread shape. Boring tools, which occur in two forms, are used for internal cutting. They may be forged tools or toolbits inserted in cylindrical bars.

Toolbits are usually high-speed steel, but in high production work carbide tipped tools are used. These consist of a tough steel shank and an extremely hard, heat-resistant tip, usually of tungsten carbide.

In shaper and planer work a toolholder is frequently used which can hold the bit straight or at 45-deg. or 90-deg. angles on either side. In planer work, gang tools with several bits are used.

Rotating Cutting Tools

Drills are the commonest tools for making round holes. They vary in size, shank form, number of flutes, and in other special particulars. Drills are made as small as 1/64 in. and as large as 3 in. in diameter. The drill used for most jobs has two spiral flutes or cutting edges. However, soft materials are often drilled with a tool having straight flutes, and a three-fluted drill is used to enlarge drilled holes. Straight shank drills go directly in drill chucks;

ROTATING CUTTING TOOLS

157. SMALL STRAIGHT SHANK DRILL

158. STRAIGHT SHANK DRILL

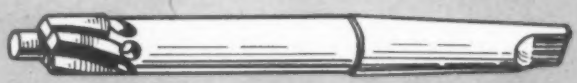
159. TAPER SHANK DRILL

160. BIT STOCK DRILL

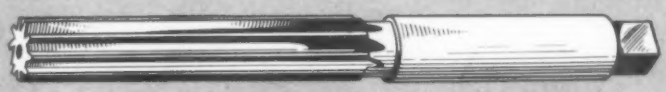
161. OIL HOLE DRILL

162. OIL TUBE DRILL

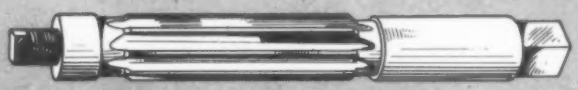
163. CENTER DRILL



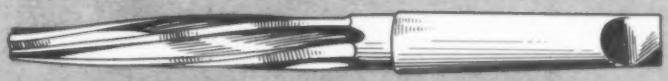
164. COUNTERBORE



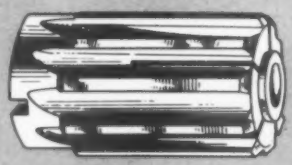
165. HAND REAMER



166. EXPANSION REAMER

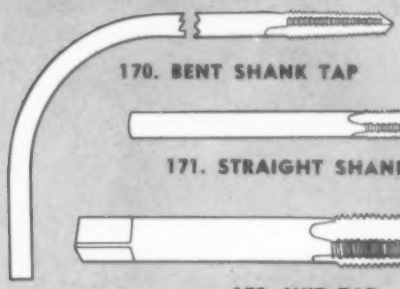


167. HIGH-SPEED CAR REAMER



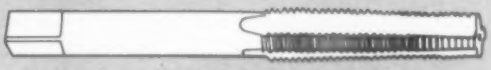
168. EXPANSION SHELL REAMER

169. ADJUSTABLE CHUCKING REAMER



170. BENT SHANK TAP

171. STRAIGHT SHANK TAP



172. NUT TAP

173. Bottoming

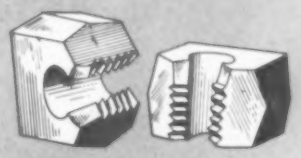
174. Plug

175. Taper

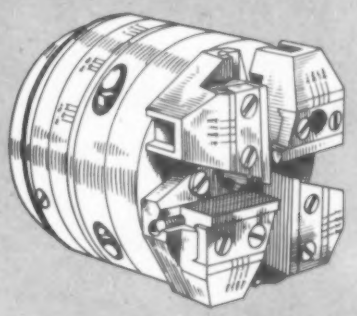
HAND TAP SET

176. MACHINE SCREW TAP

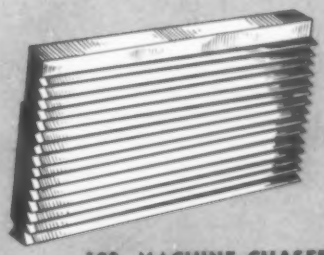
177. ROUND SPLIT DIE



178. ADJUSTABLE DIE



179. DIEHEAD



180. MACHINE CHASER

taper shanks are held in tapered sleeves or collets.

Drilled holes are frequently started with a center drill which combines a small drill and a countersink. To drill concentric holes or to face circular areas around drilled holes a counterbore is used.

Reamers are devices for finishing drilled holes to exact size and smooth finish. They may be used either by hand or in a machine, and either the work or tool may turn. A large number of styles exist but the illustrated forms are a fair sample.

Hand reamers are a fine finishing tool. The hole is drilled to 0.005 in. undersize and reamed to size. Chucking reamers are used for machine cutting and give a fine finish where extreme accuracy is not desired. Expansion and shell reamers are valuable from the point of view of economy. The expansion reamer can be enlarged slightly to take up wear. A number of shell reamers can be used on a single arbor so that only the cutting portion needs to be replaced. Adjustable reamers are more expensive but they cover a wide range of sizes and can be adjusted to take up wear. Reamers are available in diameters from ¼ in. to 3 in.

Taps are used to cut internal threads by hand or machine. A set of hand taps consists of three: a taper or starting tap, a plug tap for the bulk of work, and a tap for cutting threads to the bottom of blind holes. Machine taps are used in special machines which automatically cut the thread and back out the tap. Taps are manufactured in standard screw pitches for the various fractional diameters: machine screw taps, like machine screws, are designated by number.

Dies are used to cut external threads. When used by hand they are held in a diestock; when by machine, they are held in a diehead. Round dies are used for threads up to 1½ in., the two-part adjustable type for larger sizes. The machine chaser is used in a diehead for machine work only.

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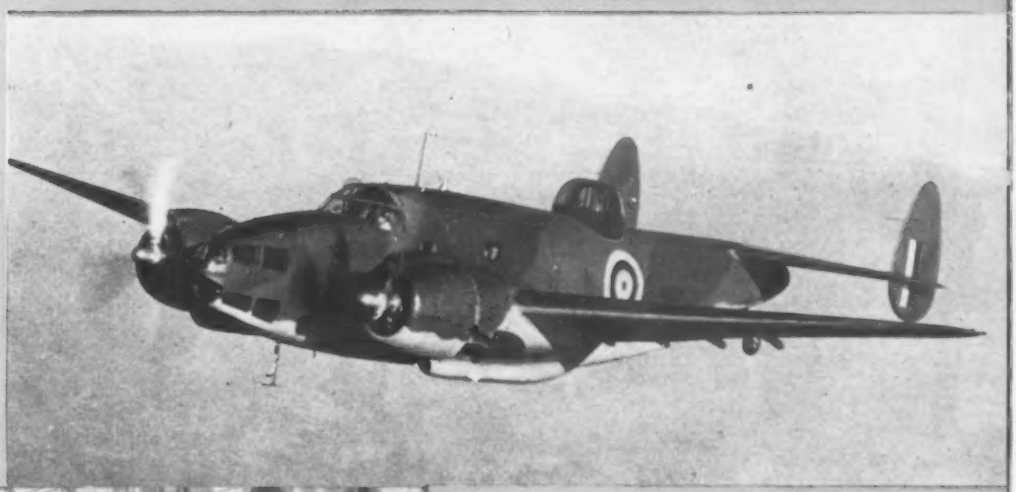
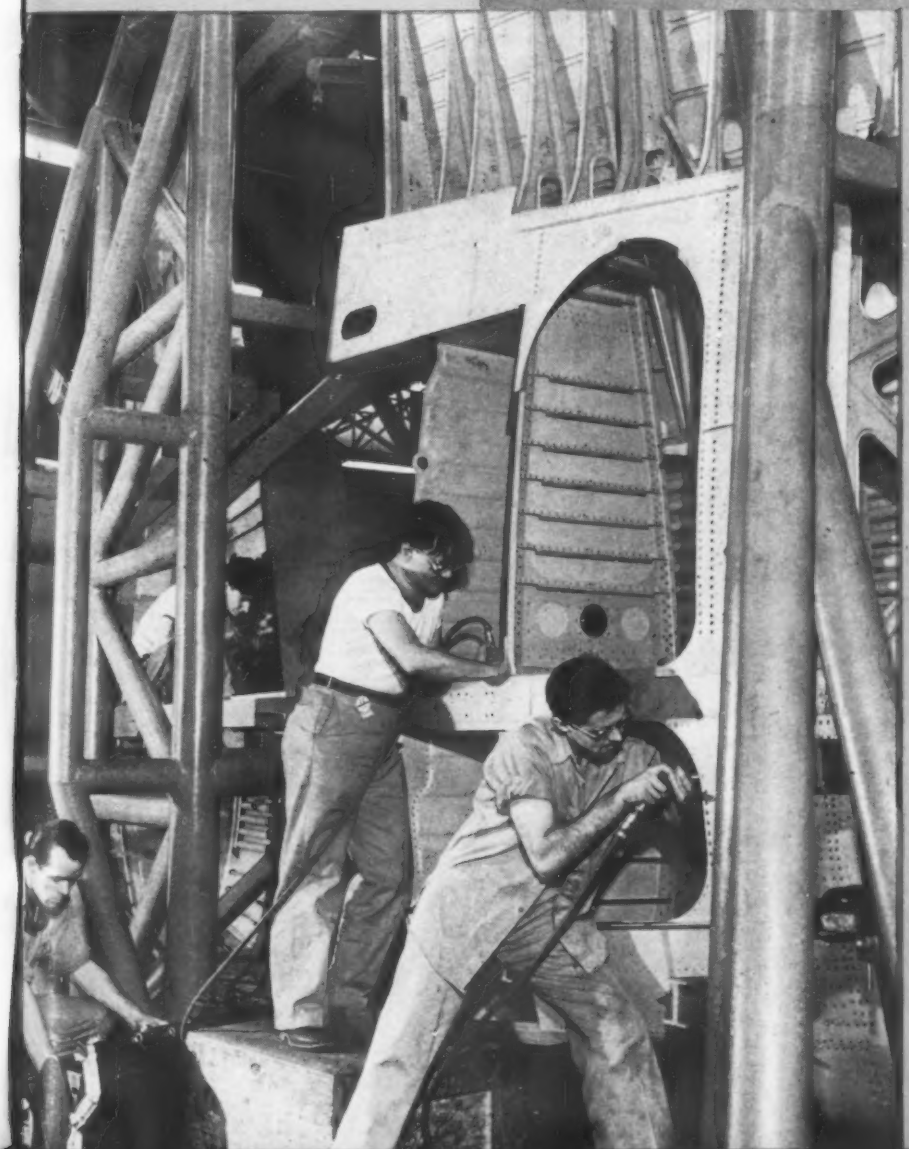
Armament

SECTION OF AMERICAN MACHINIST



The wing center section is one of the many subassemblies that make up the Vega Ventura. The heavy welded tubular construction is typical of Vega jigs



Double-Deck Assembly Of the Vega *Ventura*

By HARRY W. ALLEN
Superintendent of Assembly
Vega Aircraft Corporation

DOUBLE-DECK ASSEMBLY OF THE VEGA VENTURA

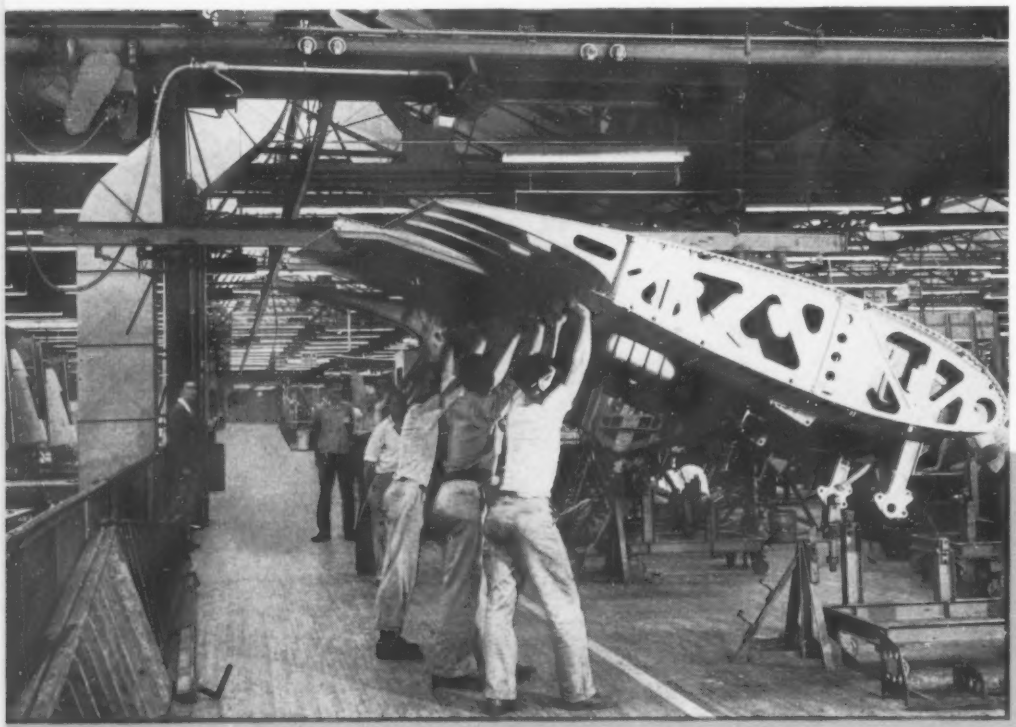
IN THE MANUFACTURE of its medium reconnaissance bomber, the Ventura, the Vega Aircraft Corporation has extended its use of the unit assembly principle. Sections of this ship have been split into major subassemblies, and these in turn are divided into minor subassemblies on each of which a maximum amount of work is done before combining with larger units.

An extensive mezzanine floor at the Vega plant is devoted to the fabrication of these major and minor subassemblies. The fuselage of the Ventura, for example, is divided into six zones for manufacturing purposes: the nose, pilot's compartment, upper section, main center section, aft section and tail cone. Each of these zones constitutes a major subassembly that is completed on the mezzanine before being transferred to the main assembly line.

Wings, nacelles and empennage surfaces are similarly divided into smaller units for ease in fabrication. Altogether, the Ventura is broken down into some 60 major subassemblies to expedite production.

Vega's manufacturing methods have mechanical advantages in the use of assembly jigs, but perhaps the greatest gain is in the more effective use of the plant personnel, many of whom are new to industry, including a high percentage of women workers. As the work is broken down into shorter and simpler operations there is less to learn on each job assignment. Consequently, the worker becomes proficient more quickly and the production rate rises.

Each subassembly follows a well planned procedure. Before coming to this department, parts are formed to size and drilled for rivet holes. Skin sections are predrilled with pilot holes which are enlarged to full size after the skin is located on the jig.



After assembly in a vertical position the wing center section is swung downward to be transported to the mating jig. Together with most other subassembly operations, this work is done on a mezzanine surrounding the main floor

(Below, left) **Another part of the mezzanine is devoted to the assembly of small electrical installations such as the soldering of wires to switch boxes.** ***(Right)*** **All electrical installations are completely tested before going into stock. Here the bomb release controls are being checked**

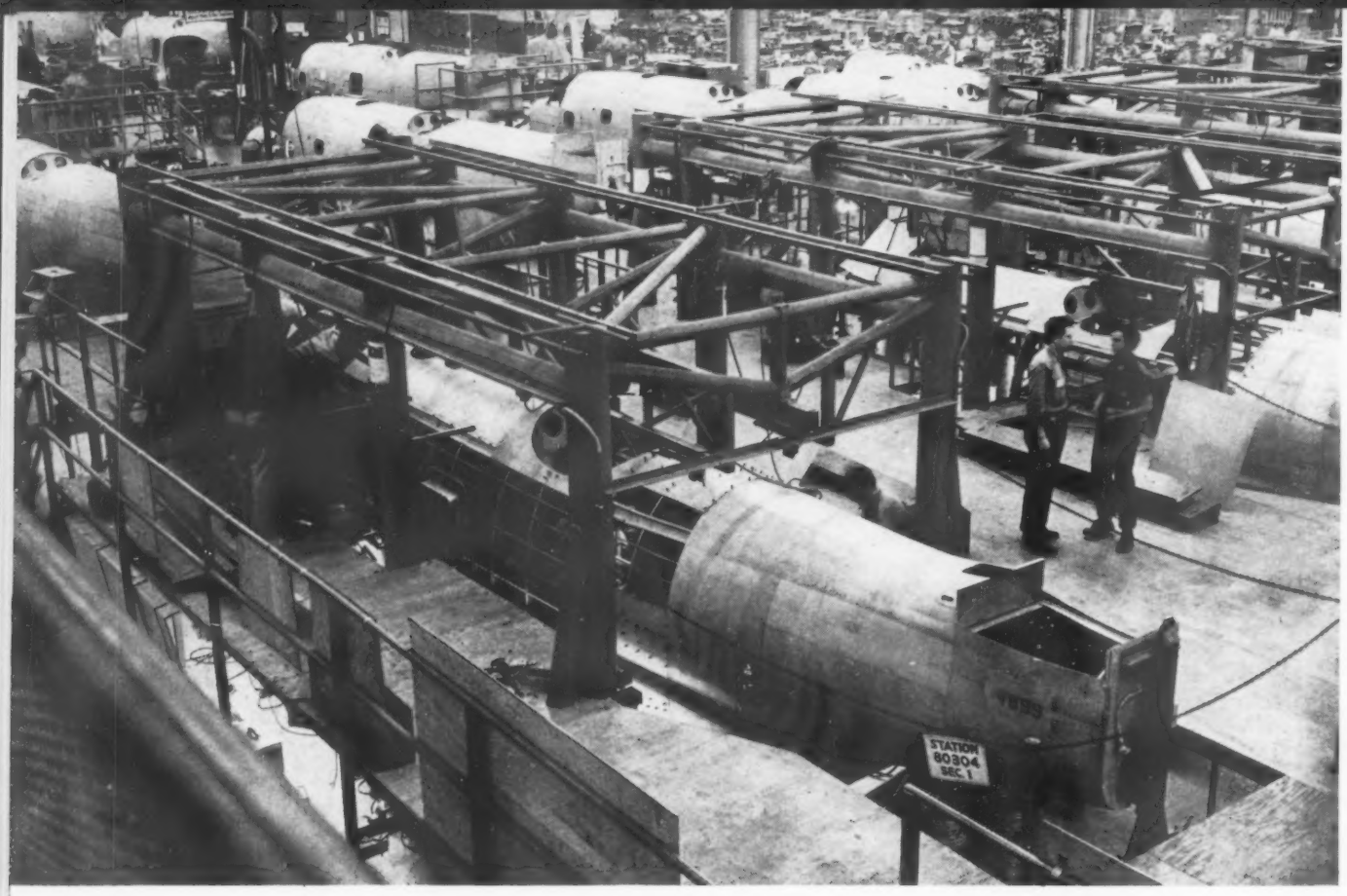
Parts are carried overhead by monorail conveyer from the mezzanine to the fuselage assembly platform and final assembly line

"Plumbing," too, is thoroughly inspected before it goes into the Ventura. One of the hydraulic test crews is shown at work

Each unit is subassembled in a rigid jig which accurately locates longerons and ribs, while the stringers and skin sections are riveted to them. Vega uses assembly jigs made of heavy tubing welded together. The frames are rigid and are provided with removable attaching devices to permit adjustment of the jigs for minor design alterations. Only enough work is done in each jig to make the subassembly a rigid structure; then the unit is transferred to a wooden frame where pick-up operations are performed to complete the riveting and any other work that is needed. Each subassembly line progresses toward the edge of the mezzanine so the completed unit can be picked up by an overhead crane and transferred to the final line. Subassemblies are given a primer coat of zinc chromate before going to the final assembly lines.

In addition to the major subassemblies there are literally hundreds of small installations that are prepared on the mezzanine floor. Many of these are part of the Ventura's electrical and hydraulic equipment. The fact that a modern military plane has from 800 to 1,000 pieces of tubing and a comparable number of electrical connections gives an idea of the magnitude of this work.

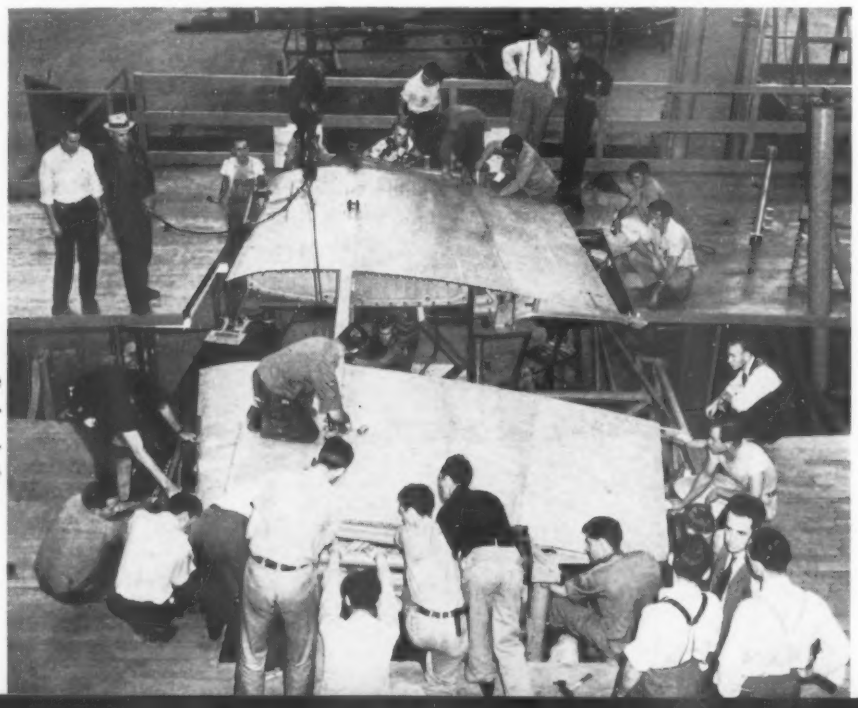
In the electrical and hydraulic departments the



object is to do as much work on the bench as possible. Tubing is bent to shape and combined with other sections of tubing to form a complete installation. A hydraulic test bench is used for all tubing and is arranged to apply controlled pressure up to 1,500 lb. per sq.in. Similarly, gas lines are tested on a gas-pressure bench before being released from this department.

The Vega assembly line consists of a platform about ten feet above the floor line, along which the assembled sections are moved progressively. Use of this platform permits work to be done on the upper and under parts of the ship simultaneously.

The first station on this platform holds a battery of three jigs in each of which the six fuselage sections are combined into one unit. The jigs locate the bulkheads and stringers, while the skin sections are applied over them. The skin is predrilled and predimpled; when it is in place holes in the stringers are opened up to match it. Connecting points have been carefully tooled in the subassembly operations, so they will match without further adjustment.



At the third station on the platform the wing center section is lowered to a "mating" jig. Care in alignment is essential

DOUBLE-DECK ASSEMBLY OF THE VEGA VENTURA

Six subassemblies are put together in the first station of a platform designed to permit work on the upper and lower portions of the fuselage simultaneously

The fuselage, progressing from platform stations 1 and 2, is placed over the wing previously located in the mating jig

Upon completion of the work in these jigs, the fuselages are moved forward to a second station, called the pick-up station, where operations are performed that cannot readily be done in the jigs. From here the fuselages progress to a pair of jigs known as mating jigs. The wing center section assembly is first located in the mating jig being transferred to it as a single unit from the mezzanine floor. This subassembly consists of the two inner wing sections, tied together by the main beam. The fuselage is transferred from the pick-up station to the mating jig over the wing center section. The fuselage nose section is added in this jig.

In the mating jig, the wing section is held by the outer wing attachment fittings. The fuselage is located by the tail wheel axis, the bomb bay door attachment fittings, front and rear, and the forward gun trunnion.

A special drilling jig is used at this station to locate the holes for the empennage attachment fittings. The holes are drilled with a portable electric drill.

An advantage of the Vega double-deck method of assembly is that it provides a solid working platform for operations on the upper part of the ship. Ladders and other temporary work platforms are avoided. In addition the platform supports racks for all tools and outlets for compressed air and electricity used with portable power tools. Also located on the platform are a few subassembly jigs for small units, such as the tail cone.

The area underneath the platform is well illuminated with fluorescent lights. Here jigs are set up for the bomb-bay door subassemblies and landing gear. After the subassemblies are completed, they are fitted to the underside of the ship with a minimum of material handling. Since the operations underneath the platform are small in relation to those above, there is ample room for these jigs near the point of installation of these subassemblies.

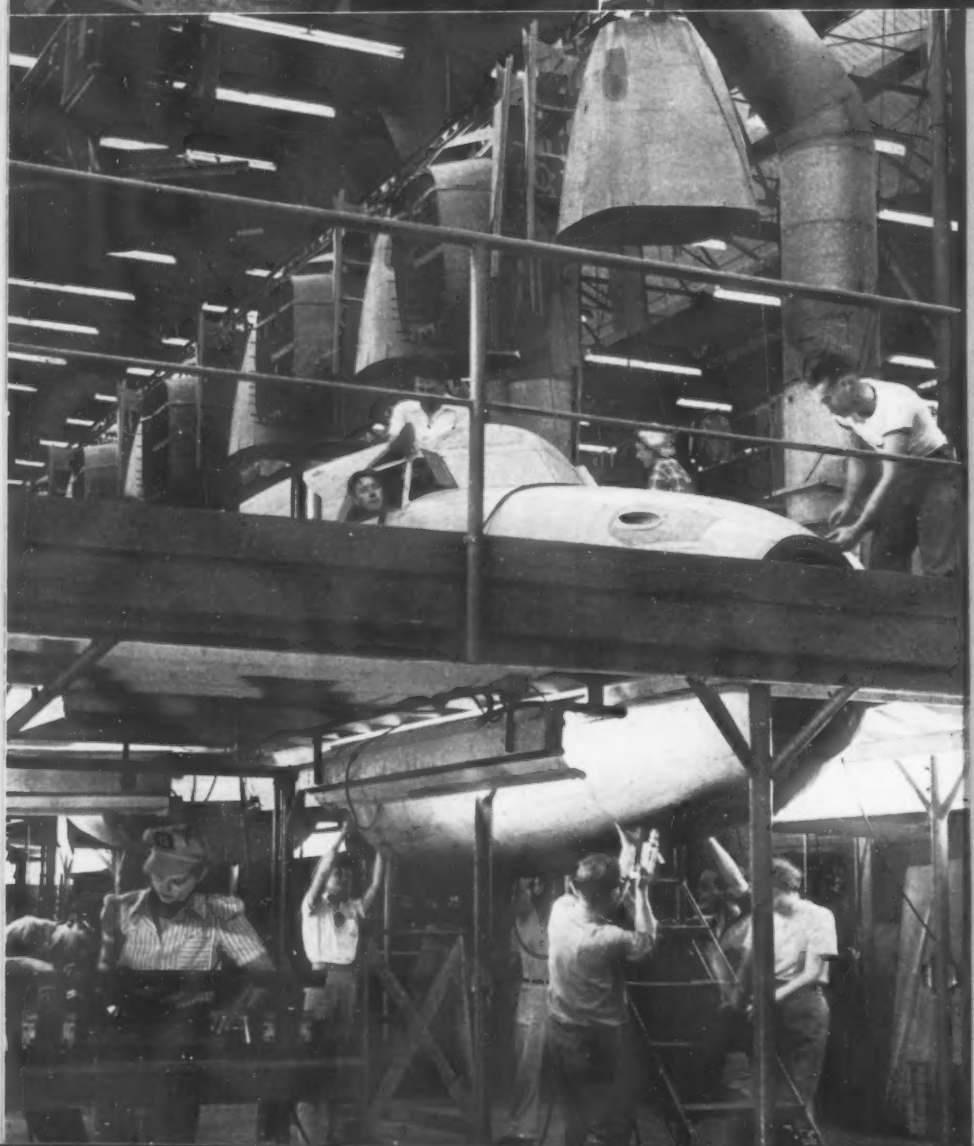
After leaving the mating jig, the fuselage and center wing section progress in a double row on the platform through six additional work stations. At each station the work has been planned so that approximately the same amount of time is consumed, permitting each assembly to progress at scheduled intervals during the day. All work planned for the station should be completed before the move is made.

The work at these stations consists entirely of numerous minor installations, most of them tied in with the complex control mechanisms of the bomber.

The assemblies come off the platform on their own landing gear, and are taken directly into a large spray booth where they are cleaned and painted. The booth is set at a 90 deg. angle to the platform; the planes are swung into it, vapor-tight doors are closed, and after the spraying is completed removed through a door at the opposite end. The booth is well equipped with exhaust ducts, and has water screens for catching surplus pigment. The fuselages are then protected with canvas tops and moved into the yard while awaiting the final fitting line.

The final line consists of 20 stations. For the first

DOUBLE-DECK ASSEMBLY OF THE VEGA VENTURA



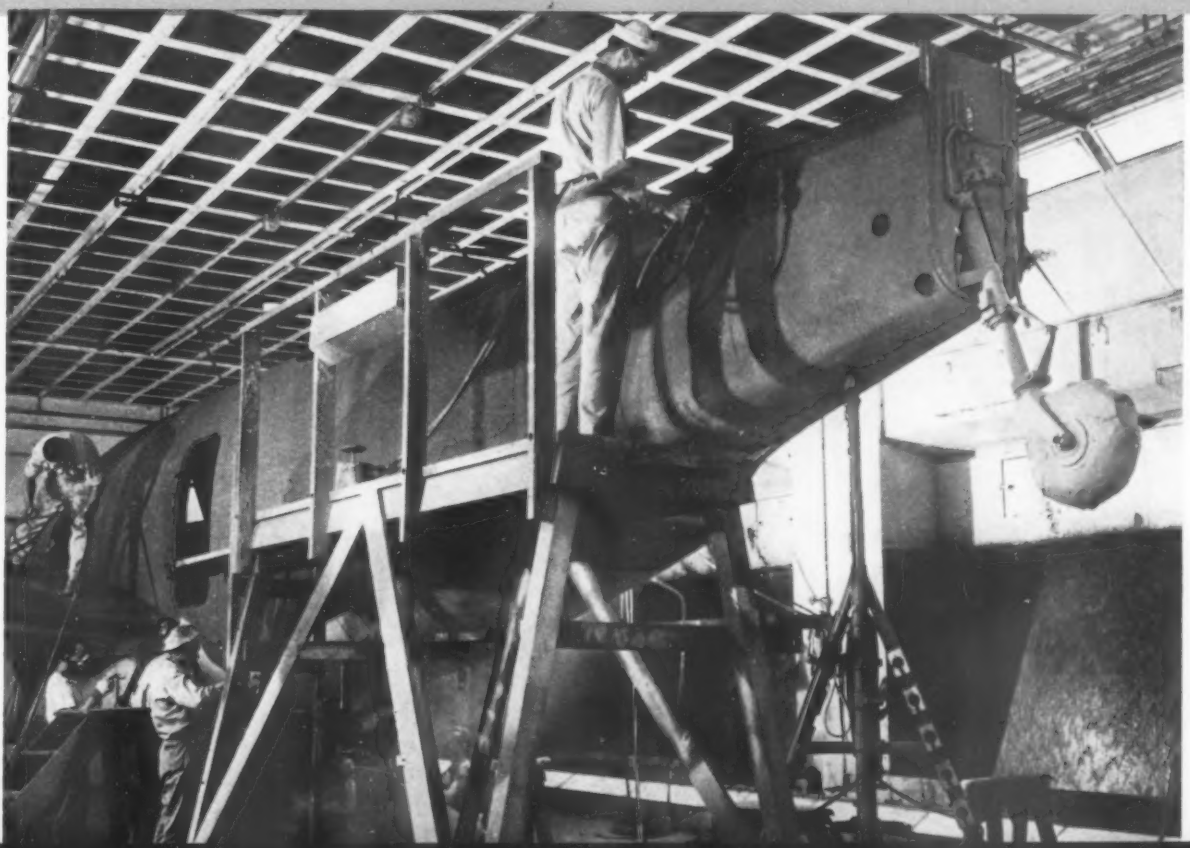
While work is being done on the upper part of the fuselage, workers below the 10-ft. platform are no less busy on the under portion. Good illumination is provided

(Above, left) One of the few sub-assemblies made on the fuselage platform is the tail cone. This unit is small and can go directly into place when completed

A view of the end of the fuselage platform shows how "double-deck" assembly works to speed assembly operations on the Ventura

The Ventura fuselage is picked off the platform after work has been completed in the last station; an overhead monorail crane is used

Camouflage paint is applied in an inclosed booth where water panels and exhaust ducts catch excess pigment



eight stations, the fuselages are provided with "roller skates," small dollies which fit over the landing-gear tires, so they may be moved sidewise. This is done to give economy of space. At the first four stations, platforms are placed from which the empennage surfaces are fitted into place. Empennage subassemblies are built up in this section of the shop, so they flow into the line at a convenient location.

At the ninth station, the fuselages are turned 90 deg. to provide additional area in which to mount the outer wing sections. These sections are fabricated in another one of the company's plants and are brought to Vega ready for assembly.

The bombers move along the last part of the line on their own landing gear with a roller stand under the tail section. At those stations where the landing gear control is tested, high wing jacks are used to support the ship. Operations along this section of the line consist of the fitting of all installations needed to complete the ship.

Careful planning and good management are responsible for a high degree of efficiency in the Ventura assembly. One step has been to make the operators specialists. If a man works on electrical installations he is not ordinarily required to do plumbing operations. This division of work tends to create a higher degree of skill.

The plan is carried out through functional management of the assembly line. There are separate supervisors for electrical work, plumbing, power plant installations, rigging and installations. Each of the supervisors is responsible for the quality of work of the men under him, and since each one is thoroughly familiar with his specialty, he is able to maintain a high standard. A lead man at each station has general charge of the ship while it is under his jurisdiction, and sees that the work is completed on schedule.

Vega also improves assembly efficiency by successful use of the "kit" system. A long stockroom, with ten windows, parallels the assembly line. In this stockroom kit cards show all parts needed for a particular installation including rivets and other standard components. When the operator is ready to start an installation he calls at the window and the 30 or 40 parts that go into his particular jobs are delivered at one time. The stockroom is arranged so that needed parts are kept near the window at all times. Excess parts are kept either in the mezzanine section of the stockroom or in the back of the bins until the supply near the windows is exhausted.

The present kit system as used on the Ventura is a result of considerable experience in delivering parts to the assembly line. At one time the attempt was made to deliver all parts needed for a given station at once.

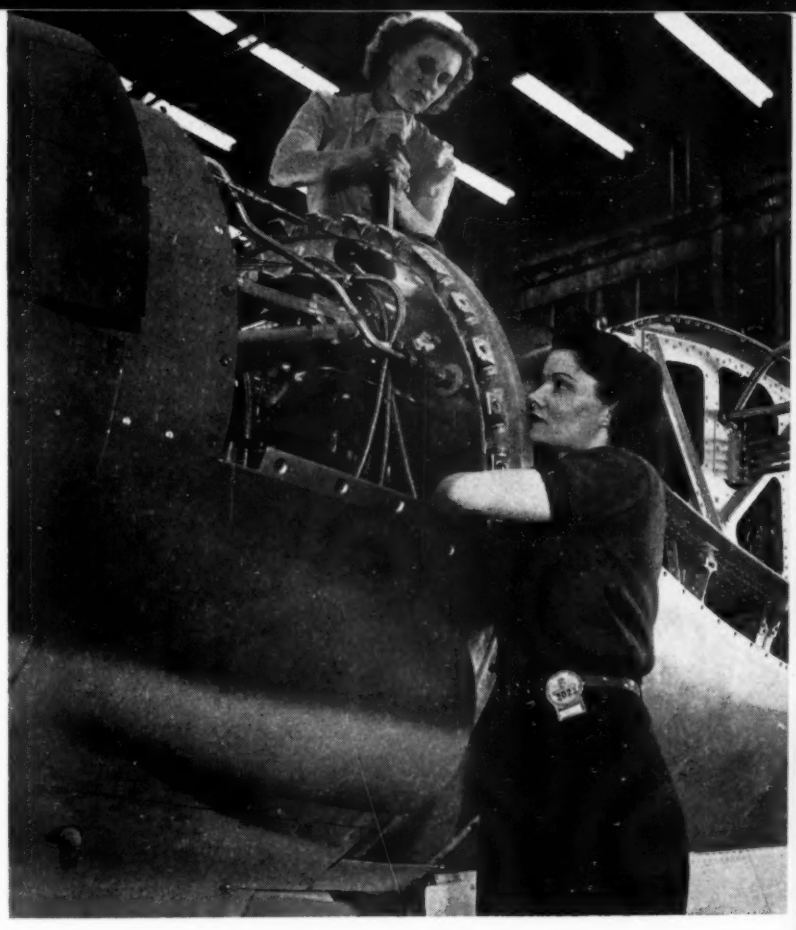
The Ventura marches down MacArthur Boulevard to the destination noted in the sign. The fuselage travels sidewise to save space

This meant that a considerable volume of material was sent to the assembly line, much of it not needed immediately. If a change of shift came along before the material was used, the man who signed for it would be out of the plant while the parts were still on the floor. Thus the line of direct responsibility for material was broken, causing some of it to be lost, delaying the installation, and requiring extra trips to the stockroom.

Under the present system, since the parts for a given installation are kept together and are signed for by the man who uses them, this trouble has been avoided. The final assembly line is paralleled by floor trenches containing electric and compressed air outlets. Electricity is supplied at 110 and 440 volts.

As an over-all control on the delivery of bombers, the assembly department contains a large board showing the position of the ships in each station. Each bomber is numbered and is colored on the board to show whether it is on schedule or behind schedule. Those ships which are behind delivery are colored in red. Naturally the whole plant works to reduce the number of these red ships and to meet delivery dates.

When the Ventura reaches the end of the assembly line it is ready for test. After it is gone over thoroughly by company inspectors, it is delivered to the military authorities.



Firewall and engine installations are added in the first section of the final assembly line. Women play a big part in building the Ventura

Wing tips are added after the ships have been turned head on to complete final installation and inspection. Then the Ventura goes out the door, headed for hostile lands

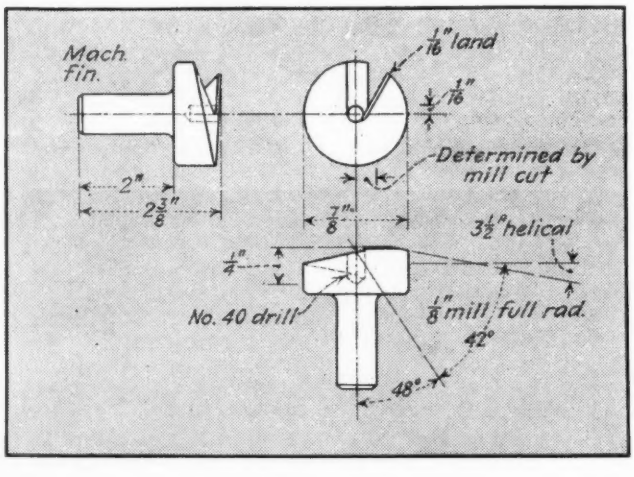
War Winning SUGGESTIONS

The following ideas were selected from those recognized as meritorious by the Board for individual Awards, War Production Drive. They are freely offered to industry as an aid to its war production.

Cutter Squares Ends of Tubing

Aluminum tubing of various diameters is used for oil, fuel and hydraulic lines in aircraft. It is necessary to clean the ends of these tubes neatly after they have been cut to proper length. This was done formerly with a hand file or disk sander, and inevitably resulted in a rough end out of square with the length of the tube.

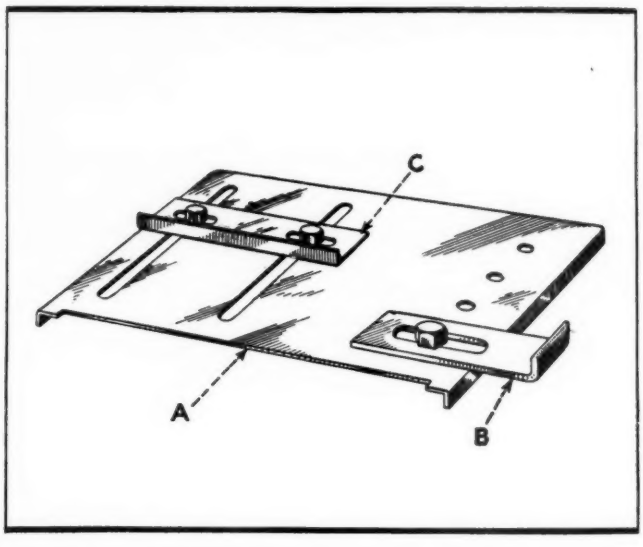
The cutter shown in the drawing is now used for squaring and finishing the end of these tubes. Made of tool steel, it is hardened and ground after the single cutting edge and



helical face are machined. It is designed to operate in a drill-press spindle for short tube lengths, although it may be used in portable units when the drill press cannot accommodate long tubes. This cutter produces square tube ends with a machine finish free of burrs in but a fraction of the time consumed by the method used previously. *Suggested by S. Cirigliano, Republic Aviation Corporation.*

Gage Controls Sheet-Metal Bends

It is suggested that an adjustable gage be made as shown in the drawing so that small sheet-metal parts can be engaged rapidly under a bending brake at the proper angle and depth. The gage consists of base *A*, end stop *B* and side stop *C*, the latter two being bent at 90 deg. so that the sheet-



metal butted against them will be square under the brake. The stops can be set as shown in the drawing, or they may be turned at any desired angle to suit the shape of the part being bent. Once the gage has been set for a certain type of bend, all parts set to it will be bent alike regardless of their size or shape or the number of bending brakes being used. It would appear that the bolt for holding end stop *B* would interfere with the proper alignment of parts in the gage. When required this stop can be turned around and used in conjunction with the side stop. *Suggested by Clement Wolf, Bell Aircraft Corporation.*

Prevents Injury to Aluminum Parts

The metal shell of Boeing fuel tanks are assembled with bolts having screw-type heads. Power-driven and spiral yankee screwdrivers were tried on this job, but were not satisfactory, because one hand had to be used to hold the nut. This presented an objectionable safety hazard, and when the power tool slipped it penetrated the aluminum tank.

A special head for a speed screwdriver was designed that did not slip from the bolt. It has a guard feature which can be accentuated to fit the type of screw or bolt used. All assemblymen on this work have been equipped with these special screwdrivers, the use of which has not only eliminated

damaged tanks, but has also speeded assembly over that when two men did the work—one to hold the nut and one to handle a straight screwdriver. The special head, shown in the inset illustration at the right, can be used safely with speed screwdrivers. *Suggested by Carl C. Fleming, The Goodyear Tire and Rubber Company.*

Masonite Jigs

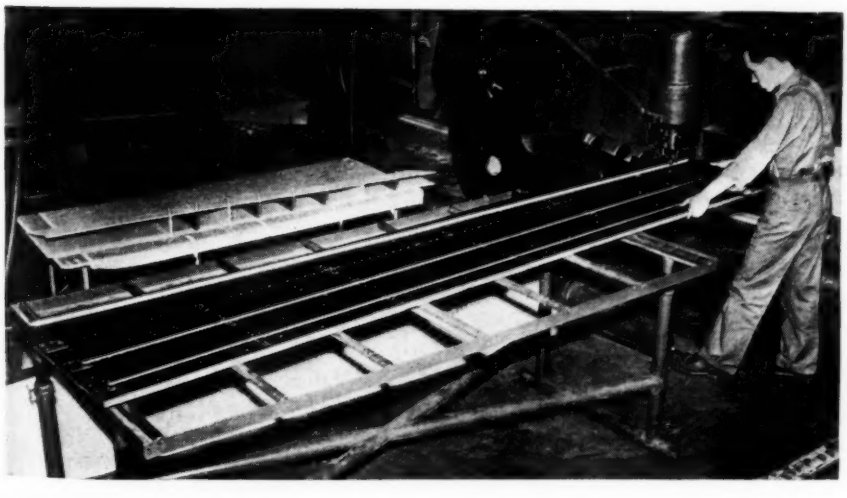
It is common practice when punching and riveting airplane sheets and structural shapes in one operation on Erco (Engineering Research Company) machines to use templets or jigs made of metal. These jigs are index plates with a series of countersunk holes spaced to duplicate the rivet pattern desired; the work is located at the machine by a stud on the punch anvil that fits in these countersunk holes.

The hole is punched in the sheet, and the rivet is set in two consecutive operations by one operator. This method is not new, and is used extensively because of its time-saving advantage over the ordinary method of pre-drilling the sheets, burring the holes, assembling the parts, inserting the rivets by hand, and driving and bucking the rivets. The index jigs for the Erco machine when made of metal are cumbersome and heavy when large work is involved, thereby promoting operator fatigue.

It is suggested that these jigs, both large and small, be made of masonite. This would minimize operator fatigue, release for other uses metal that is now required to make metal jigs, cut jig production costs, and because of their light weight would permit women to handle what would otherwise be a strenuous operation. Whether metal or masonite is used in the jigs for the Erco method, speed of operation is practically the same; however, the lighter masonite jigs permit speedier handling of the jigs between operations, and where they have been used production has increased 100 percent. *Suggested by Ben E. Stewart, Airplane Division, Curtiss-Wright Corporation.*

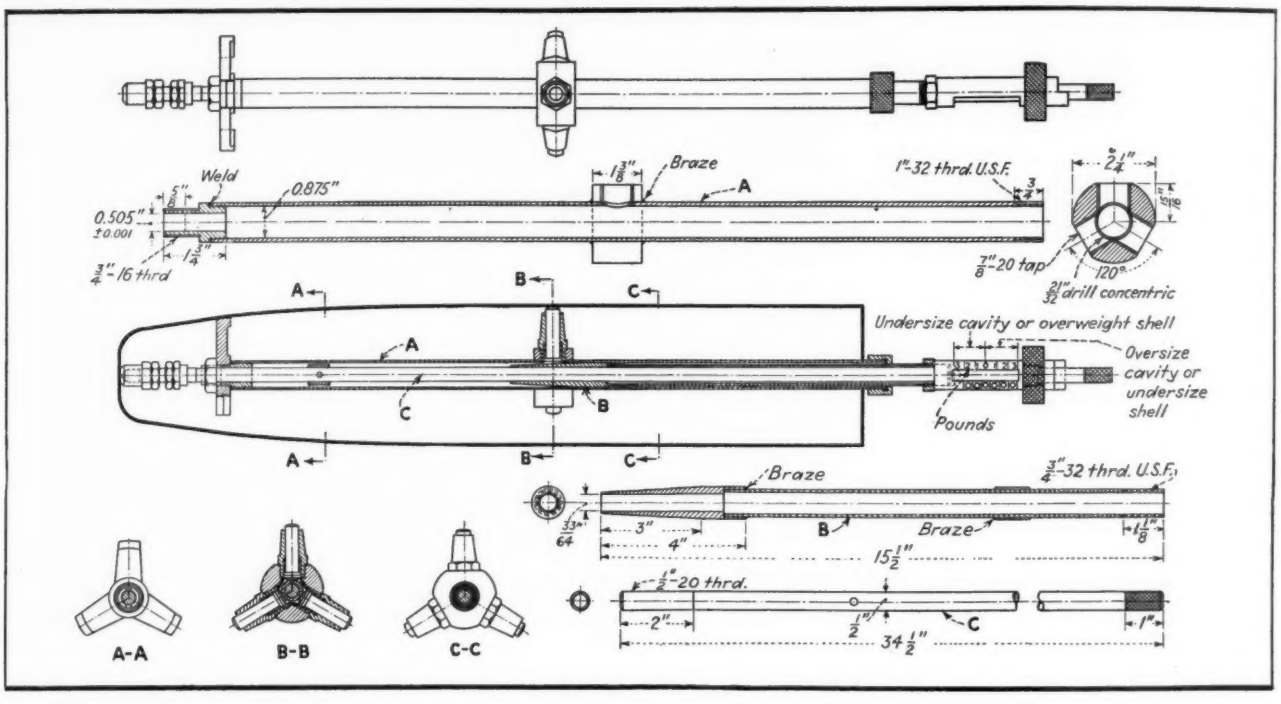
Gage Gives Weight Factor of Holes

At the start of machining 155-mm. shell, it was found that we could not take a forging and machine it to a set dimension on the outside surface and yet meet the specified weight limits—the correct finished weight could not be maintained because of the allowable tolerances of the cavity dimensions. Therefore, it was decided that there should be some accurate and speedy method devised to determine the loss or gain of weight in which the cavity is the controlling factor. The gage illustrated on the following page was designed for this purpose.



The diameter of the taper portion of the shell cavity is measured at one end of the gage, while the center gage arm measures the straight side of the cavity. The results of these two measurements are compounded and registered on the head of the gage in terms of weight. In other words, the gage weighs the hole. Since the weight factor of the cavity is thereby determined, it is now possible to hold the finished weight of the shell to that specified.

As shown in the drawing, the arms of the gage for determining the diameter at the taper end of the cavity are manipulated by rod *C*. The arms at the center of the gage, mounted on tube *A*,



are set by adjusting the tapered end of tube *B*. When all arms are adjusted properly, the scale graduated in pounds records the weight factor of the shell cavity.

The gage is durable and easy to handle, and three of them are currently in use to check total production running into thousands of shells daily. Even though subject to hard use, maintenance is nil, which is a considerable saving over the indicator gages used formerly.

It is difficult to estimate the total savings in dollars by the adoption of this gage. However, in reviewing the records, the following savings are conservatively estimated: $26,624 for inspection and labor attendant with handling scrap shell. It has reduced the scrap charge to the material account 50 percent, which according to production since the gage was adopted would amount to a saving of 4,083 shell forgings. Also, approximately 300,000 forgings which were off on cavity dimensions have been reclassified correctly to give proper weight and still maintain specifications on the finished outside diameter. *Suggested by Frank Speke and Clarence Reynolds, Willys-Overland Motors, Inc.*

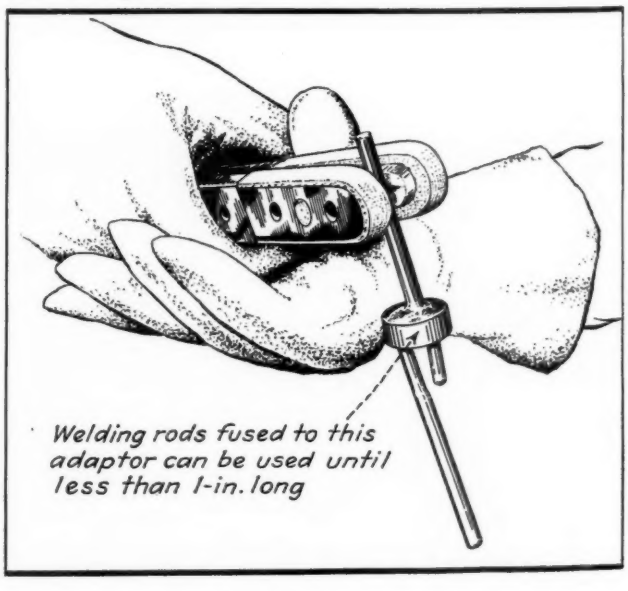
Short Ends of Welding Rods Used

The waste and loss in welding rods has been a major industrial problem since consumption reached the total of thousands of tons daily. The alloy in rod drains heavily on the country's restricted metal supply.

Common holding tools do not allow complete use of the rods; frequently as much as 2½ or 3 in. of rod is not used because the holder interferes with the part being welded.

The illustrated holder is a comparatively simple device made from cold-rolled steel. The stem is held in the regular welding rod holder, and the head acts as a backing plate for the welding rod. Touching the adaptor to the welding rod to be used picks up the rod through a light weld.

Since the rod is not gripped by any fixture, the welding operation can be continued virtually to the end of the rod. With the stub end of the first rod still remaining, another new rod is picked up as before, and this continues until six or eight rods have been used. Then the stub ends, only a fraction of an inch long, are knocked off easily. *Suggested by Raymond Baugh, Cadillac Motor Car Division, General Motors Corporation.*



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TIME-DATA SHEET NO. 38

Radial Drill Press Operations—III

Allowance Symbol	Size of Part: Very Large By Hand	Very Large Job Crane	Very Large Overhead Crane
Constant	0.0153	0.0772	0.1230
K	0.0105	0.0105	0.0105
L	0.0229	0.0229	0.0229
M	0.0047	0.0047	0.0047
N	0.0031	0.0042	0.0042
P	0.0019	0.0019	0.0019
Q	0.0025	0.0025	0.0025
R	0.0016	0.0016	0.0016
S	0.0050	0.0050	0.0050
T	0.0100	0.0100	0.0100
K_1	0.0046	0.0046	0.0046
F_1	0.0061	0.0061	0.0061
G_1	0.0121	0.0121	0.0121
L_1	0.0046	0.0600	0.1030
M_1	0.0585	0.0585	0.0585
N_1	0.0043	0.0043	0.0043
P_1	0.0084	0.0084	0.0084
Q_1	0.0022	0.0022	0.0022
R_1	0.0455	0.0455	0.0455
S_1	Table 1	Table 1	Table 1

(Add machining time allowances from Tables 2 to 16, inclusive.)

Where: Constant = Allowance for handling part on table.
K = Number of times chucks are put in and removed — use this allowance in each piece time only when it is necessary to change chucks. Otherwise, allow the value in the set-up allowance.
L = Number of times keyed chucks are put in and removed (drills over 1 7/8 in.) — use this allowance only when it is necessary to change chucks. Otherwise, allow the value in the set-up allowance.
M = Number of times tools are put in chucks and removed.
N = Number of times arm is moved to hole or from hole to hole.
P = Number of tap holes lubricated with brush.
Q = Number of holes burred (includes move arm and locate).
R = Number of "blind" holes tapped (includes blow out chips).
S = Number of times machine dial is set for depth.
T = Number of times arm is raised and lowered on column.

Table No. 1—Line Up Part on Table

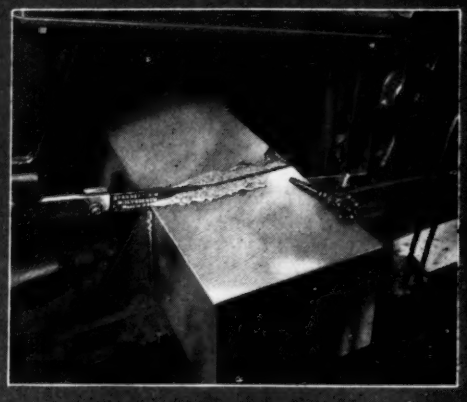
Method	Size of Part: Small	Medium	Large
Surface gage	0.0094	0.0156	0.0322
Square	0.0062	0.0125	0.0300
Level	0.0114	0.0208	0.0354

Table No. 2—Time to Drill Cast Steel

(*Peripheral Speed — 65 Ft. per Min.*)

Drill Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3
R.P.M.	994	662	497	330	248	199	165	142	124	111	100	90	83
Feed	0.006	0.009	0.012	0.012	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.012	0.012
Drill Lead	0.075	0.113	0.150	0.225	0.300	0.376	0.451	0.526	0.600	0.675	0.750	0.825	0.900
Depth	Allowed time in decimal hours (includes drill lead)												
1/8	0.0006	0.0008	0.0009	0.0017	0.0022	0.0032	0.0045	0.0059	0.0075	0.0092	0.0102	0.0168	0.0198
1/4	0.0009	0.0011	0.0013	0.0023	0.0028	0.0040	0.0055	0.0070	0.0088	0.0106	0.0118	0.0191	0.0221
3/8	0.0014	0.0016	0.0017	0.0029	0.0035	0.0048	0.0065	0.0081	0.0100	0.0121	0.0135	0.0213	0.0246
1/2	0.0018	0.0020	0.0021	0.0035	0.0041	0.0056	0.0074	0.0093	0.0113	0.0136	0.0151	0.0235	0.0269
5/8	0.0022	0.0024	0.0025	0.0041	0.0047	0.0064	0.0080	0.0103	0.0127	0.0149	0.0166	0.0256	0.0294
3/4	0.0026	0.0028	0.0029	0.0047	0.0054	0.0072	0.0089	0.0115	0.0139	0.0164	0.0183	0.0279	0.0317
7/8	0.0030	0.0032	0.0033	0.0053	0.0060	0.0080	0.0098	0.0126	0.0152	0.0178	0.0198	0.0301	0.0342
1	0.0035	0.0036	0.0037	0.0059	0.0066	0.0088	0.0107	0.0138	0.0165	0.0193	0.0215	0.0324	0.0365
1 1/8	0.0038	0.0040	0.0041	0.0065	0.0073	0.0096	0.0117	0.0149	0.0178	0.0207	0.0230	0.0345	0.0390
1 1/4	0.0041	0.0043	0.0045	0.0071	0.0079	0.0104	0.0126	0.0160	0.0190	0.0222	0.0247	0.0368	0.0413
1 3/8	0.0046	0.0048	0.0049	0.0077	0.0086	0.0112	0.0135	0.0171	0.0204	0.0236	0.0262	0.0389	0.0438
1 1/2	0.0050	0.0052	0.0053	0.0083	0.0092	0.0120	0.0144	0.0183	0.0216	0.0250	0.0279	0.0412	0.0461
1 3/4	0.0058	0.0060	0.0061	0.0095	0.0105	0.0136	0.0163	0.0205	0.0242	0.0280	0.0310	0.0456	0.0509
2	0.0066	0.0068	0.0069	0.0107	0.0117	0.0152	0.0181	0.0228	0.0268	0.0308	0.0343	0.0501	0.0557
2 1/4	0.0073	0.0075	0.0077	0.0119	0.0130	0.0168	0.0200	0.0250	0.0293	0.0336	0.0375	0.0545	0.0605
2 1/2	0.0082	0.0084	0.0085	0.0131	0.0143	0.0184	0.0218	0.0273	0.0319	0.0366	0.0407	0.0589	0.0653
2 3/4	0.0091	0.0092	0.0093	0.0143	0.0156	0.0200	0.0236	0.0296	0.0345	0.0394	0.0440	0.0633	0.0701
3	0.0099	0.0100	0.0101	0.0155	0.0168	0.0216	0.0255	0.0318	0.0370	0.0423	0.0470	0.0677	0.0749
3 1/4	0.0105	0.0107	0.0109	0.0167	0.0181	0.0232	0.0274	0.0340	0.0396	0.0451	0.0503	0.0721	0.0797
3 1/2	0.0114	0.0115	0.0117	0.0179	0.0194	0.0248	0.0292	0.0363	0.0422	0.0480	0.0536	0.0766	0.0845
3 3/4	0.0123	0.0123	0.0125	0.0191	0.0206	0.0264	0.0310	0.0386	0.0448	0.0510	0.0566	0.0810	0.0893
4	0.0130	0.0131	0.0133	0.0203	0.0219	0.0277	0.0329	0.0408	0.0475	0.0538	0.0600	0.0855	0.0941
4 1/4	0.0137	0.0139	0.0141	0.0215	0.0232	0.0296	0.0348	0.0430	0.0500	0.0567	0.0630	0.0899	0.0990
4 1/2	0.0146	0.0147	0.0149	0.0227	0.0245	0.0312	0.0366	0.0453	0.0525	0.0595	0.0660	0.0943	0.1038
4 3/4	0.0155	0.0155	0.0157	0.0238	0.0257	0.0328	0.0384	0.0475	0.0550	0.0625	0.0690	0.0987	0.1085
5	0.0162	0.0163	0.0165	0.0250	0.0270	0.0341	0.0403	0.0498	0.0575	0.0653	0.0728	0.1032	0.1133
Per Inch	0.0032	0.0032	0.0032	0.0048	0.0051	0.0064	0.0078	0.0090	0.0103	0.0115	0.0128	0.0177	0.0192

STARRETT HACKSAWS



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TIME-DATA SHEET NO. 39

Radial Drill Press Operations—IV

K_1 = Number of holes spot drilled from layout (move to hole or from hole to hole).
F_1 = Number of clamps — already in place.
G_1 = Number of clamps — placed and removed complete.
L_1 = Number of times part is turned over on table.
M_1 = Number of plate jigs used (place, locate, clamp and remove).
N_1 = Number of holes spot drilled in jig plate (move to hole or from hole to hole).
P_1 = Number of times part is shimmed.
Q_1 = Number of jacks set (per jack).
R_1 = Number of times machine table is adjusted at an angle and returned.
S_1 = Number of times part is lined up on table.

APPLICATION:

This formula applies to all machining performed on 3-, 4-, 5- and 6-ft. radial drill presses under conditions existing on date this formula was made effective.

ANALYSIS:

Tools and Accessories:

The operator will use 6- and 12-in. scales, level, square, protractor, surface gage, ball peen hammer, copper mallet, brush, assortment of open end wrenches, monkey wrench, oil can, clamps, parallels, shims, bolts, angle plates, vise, jigs and fixtures.

Work is held on the machine table by clamps, vise, jig or fixture. A fixture is made when it will reduce the handling time and the activity of the part warrants the investment. Jigs and fixtures are also made for less active precision jobs.

Definitions of Terms Used:

A *plate jig* is a simple, inexpensive jig, generally made from a piece of boiler plate, containing bushings and machined to fit a turned flange or other machined surface on a casting.

A *conjunction part* of a jig is the part made to swing aside or to be removed entirely after it has been used to drill the inside holes, so as not to interfere with the drilling of the other holes. This construction is only used on large jigs.

A *trunnion jig* is a jig that can be turned around on a set of axes. The bearing holes are located in the jig, and the axes, or pins, on which the jig revolves are located in the trunnions or stands. When the locking pins are removed, the jig can be turned 360 deg., or to any angle desired. The direction of rotating the jig can be changed by using another set of bearing holes located at right angles to the first set. This construction is used only on very large jigs.

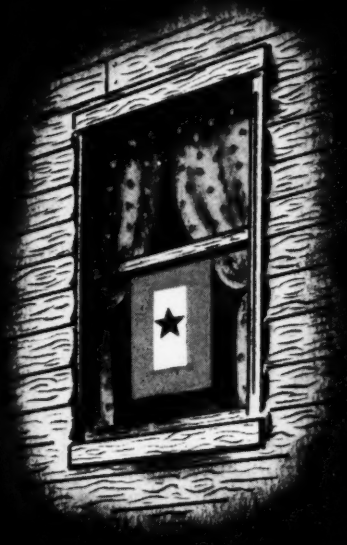
Grinding of Tools:

All tools (drills, reamers, taps, counterbores, countersinks and other cutting tools, as well as the jigs and fixtures used for a given job) should be returned to the toolroom when not in use. There they will be resharpened and repaired. The toolroom is properly equipped to do this work, hence no tools should be ground by the drill press operator. No time has been allowed the operator for sharpening his own tools.

Table No. 3—Time to Drill Cold or Hot Rolled Steel

(Peripheral Speed — 80 Ft. per Min.)

Drill Size	1/4	3/8	1/2	3/4	1	1 1/4	1 1/2	1 3/4	2	2 1/4	2 1/2	2 3/4	3
R.P.M.	1200	815	611	408	306	245	204	175	153	136	122	111	102
Feed	0.006	0.009	0.012	0.012	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.012	0.012
Drill Lead	0.075	0.113	0.150	0.225	0.300	0.376	0.451	0.526	0.600	0.675	0.750	0.825	0.900
Depth	Allowed time in decimal hours (includes drill lead)												
1/8	0.0005	0.0006	0.0007	0.0014	0.0018	0.0026	0.0035	0.0047	0.0060	0.0074	0.0090	0.0136	0.0161
1/4	0.0007	0.0009	0.0010	0.0018	0.0023	0.0032	0.0043	0.0056	0.0070	0.0086	0.0103	0.0154	0.0180
3/8	0.0012	0.0013	0.0014	0.0023	0.0028	0.0039	0.0051	0.0065	0.0080	0.0097	0.0117	0.0172	0.0200
1/2	0.0016	0.0016	0.0017	0.0028	0.0033	0.0045	0.0059	0.0074	0.0091	0.0109	0.0129	0.0190	0.0219
5/8	0.0019	0.0019	0.0020	0.0033	0.0038	0.0051	0.0067	0.0083	0.0101	0.0120	0.0142	0.0208	0.0239
3/4	0.0022	0.0023	0.0023	0.0038	0.0043	0.0058	0.0074	0.0092	0.0111	0.0132	0.0155	0.0226	0.0258
7/8	0.0026	0.0026	0.0026	0.0043	0.0049	0.0064	0.0082	0.0101	0.0122	0.0143	0.0168	0.0244	0.0278
1	0.0028	0.0029	0.0030	0.0048	0.0054	0.0071	0.0089	0.0110	0.0132	0.0155	0.0181	0.0262	0.0297
1 1/8	0.0032	0.0032	0.0033	0.0052	0.0059	0.0077	0.0098	0.0119	0.0142	0.0166	0.0194	0.0279	0.0317
1 1/4	0.0035	0.0035	0.0036	0.0057	0.0064	0.0084	0.0105	0.0128	0.0152	0.0178	0.0207	0.0297	0.0336
1 3/8	0.0038	0.0039	0.0040	0.0062	0.0069	0.0090	0.0113	0.0137	0.0163	0.0190	0.0220	0.0315	0.0356
1 1/2	0.0043	0.0042	0.0043	0.0067	0.0074	0.0097	0.0120	0.0146	0.0173	0.0202	0.0233	0.0333	0.0374
1 3/4	0.0049	0.0043	0.0049	0.0077	0.0085	0.0110	0.0135	0.0164	0.0194	0.0224	0.0258	0.0369	0.0413
2	0.0056	0.0055	0.0056	0.0087	0.0095	0.0122	0.0151	0.0182	0.0214	0.0248	0.0284	0.0405	0.0452
2 1/4	0.0061	0.0061	0.0062	0.0096	0.0105	0.0135	0.0166	0.0200	0.0235	0.0270	0.0310	0.0440	0.0492
2 1/2	0.0070	0.0068	0.0069	0.0106	0.0115	0.0148	0.0182	0.0218	0.0256	0.0294	0.0335	0.0476	0.0531
2 3/4	0.0076	0.0075	0.0075	0.0116	0.0126	0.0161	0.0197	0.0236	0.0276	0.0317	0.0361	0.0512	0.0570
3	0.0088	0.0081	0.0082	0.0125	0.0136	0.0174	0.0212	0.0254	0.0296	0.0340	0.0388	0.0547	0.0608
3 1/4	0.0089	0.0087	0.0088	0.0135	0.0147	0.0187	0.0228	0.0272	0.0317	0.0363	0.0413	0.0583	0.0647
3 1/2	0.0097	0.0094	0.0095	0.0145	0.0157	0.0200	0.0243	0.0290	0.0338	0.0386	0.0440	0.0619	0.0686
3 3/4	0.0103	0.0100	0.0101	0.0155	0.0167	0.0212	0.0258	0.0308	0.0360	0.0410	0.0465	0.0655	0.0725
4	0.0110	0.0107	0.0108	0.0164	0.0177	0.0223	0.0274	0.0326	0.0380	0.0432	0.0490	0.0690	0.0764
4 1/4	0.0115	0.0113	0.0114	0.0174	0.0188	0.0238	0.0290	0.0344	0.0400	0.0455	0.0516	0.0725	0.0803
4 1/2	0.0123	0.0120	0.0121	0.0184	0.0198	0.0250	0.0305	0.0362	0.0420	0.0478	0.0542	0.0761	0.0842
4 3/4	0.0130	0.0126	0.0127	0.0193	0.0208	0.0264	0.0320	0.0380	0.0440	0.0500	0.0570	0.0797	0.0881
5	0.0137	0.0133	0.0134	0.0203	0.0218	0.0274	0.0336	0.0398	0.0460	0.0525	0.0595	0.0832	0.0920
Per Inch	0.0027	0.0026	0.0026	0.0039	0.0041	0.0051	0.0062	0.0072	0.0083	0.0093	0.0103	0.0143	0.0156



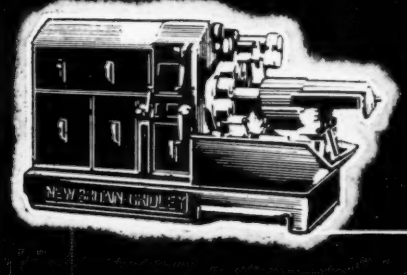
BRING THE LAST HOUR OF THE WAR NEARER

Every hour this war lasts is another hour of death and destruction. Every hour saved on the production of vital war material is helping to end this war sooner. Even though it's but a matter of seconds, it all adds up to bringing the last hour of the war nearer.

NEW BRITAIN AUTOMATICS are helping mightily wherever they are manned. Keep them manned constantly, every hour of the day and night. They can take it.

NEW BRITAIN-GRIDLEY • MACHINE DIVISION
THE NEW BRITAIN MACHINE CO., • NEW BRITAIN, CONN.

ARMY E NAVY



NEW BRITAIN AUTOMATICS
GET MORE DONE IN WAR OR PEACE

Licking the Platter Clean

AMERICA has discovered that it does not possess unlimited quantities of everything. It must resort to the rationing of many commodities.

Mere rationing, however, does not accomplish its purpose unless the rationed product is used wisely and is not wasted.

It is against the public interest in the East to drive at all unless on an essential errand. It is becoming less popular day by day to order food and then send portions of it back uneaten. The coming style is to lick the platter clean.

In manpower today, of which we don't have too much, we are not licking the platter clean. Wasteful practices still exist.

Many men in war plants loaf on the job or take it easy. Manufacturers report case after case where newcomers, eager to produce as much as possible, are told by fellow workers to be less ambitious.

Feather-bed rules of unions, requiring employment of more men than necessary to do a specified job, continue in force. In peacetime there is slight if any justification for such rules. In wartime they are indefensible.

Railroad brotherhoods are talking about relaxing such regulations. They as well as other unions should heed the fact that time is short and the public's patience not inexhaustible.

Absenteeism is one of our worst wastes. Running as high as 12 percent in certain West Coast aircraft factories, it is an extravagance that we cannot afford. Various methods are being used to combat it, but no one plan seems effective for more than a brief time.

We can think of several reasons for all of these labor wastes. One is the fact that money is coming more easily to millions of Americans than ever before and they want time to spend it. Perhaps more important is the absence of a feeling of personal danger.

Though more than a million Americans are overseas, the war is still a faraway affair to the factory worker. Bombing as a personal experience comes no nearer than a newsreel theater.

Captain Rickenbacker no doubt is right in saying that if the men at Guadalcanal could be brought home, they would gladly work in war factories with far greater zeal than workers now show. Absenteeism would disappear. There is no absenteeism in the foxholes of the South Pacific.

Passage of laws and issuance of Presidential edicts probably will not end the waste in manpower. Compulsion is of slight avail in a democracy. The only solution to the problem is to convince union leaders and the rank and file that it is to their own personal interest to do their part in the war without stint.

It should not take uncommon perception for America's workers to realize that if we should lose the war, they will be the first to suffer. Based on his record to date, Hitler is no friend of theirs.

Moreover, the nation will remember after the war who did their part and who didn't.

Burnham Finney

GAGING BUSINESS

Emphasis on production of component parts has brought results. Merchant shipbuilding will see increased prefabrication in '43. Despite cancellations, machine tool production is near all-time peak. Large tool pool orders unlikely

Seek to Spread Components Intensive efforts made the past few weeks by the War Production Board to increase the output of critically needed component parts for vital war products already are proving successful. As immediate requirements of the claimant agencies, such as the Army, Navy and Lend-Lease, were stepped up, the demand for components rose sharply. This demand is being met by examining the order books of companies making components, by spreading the work out more evenly among these companies thereby speeding deliveries, and by farming out a much larger share of the total business.

What the plan really embraces is simply utilizing regular lines of production in an orderly manner to the limits of capacity. Where these limits are too small, other facilities are being brought into use. This method is being employed so satisfactorily that one item which was extremely critical forty days ago is now off the critical list. The contemplated increase in airplane output to 11,000 a month by the end of the year is an example of the extent to which greater production of parts and components must be secured. The jump in numbers of planes is 100 percent compared with last December. But, because of the bigger size of planes, the increased tonnage to be produced is much greater and there is far more work per plane.

Satellite Plants Prove Successful Plans for nearby satellite plants, as worked out by California airplane manufacturers, will figure prominently in expanding output in some lines. Most of these satellite plants are small companies which have been converted from entirely different operations. They produce surprisingly well, once they are set for a job. In heavier lines, the use of such plants is limited.

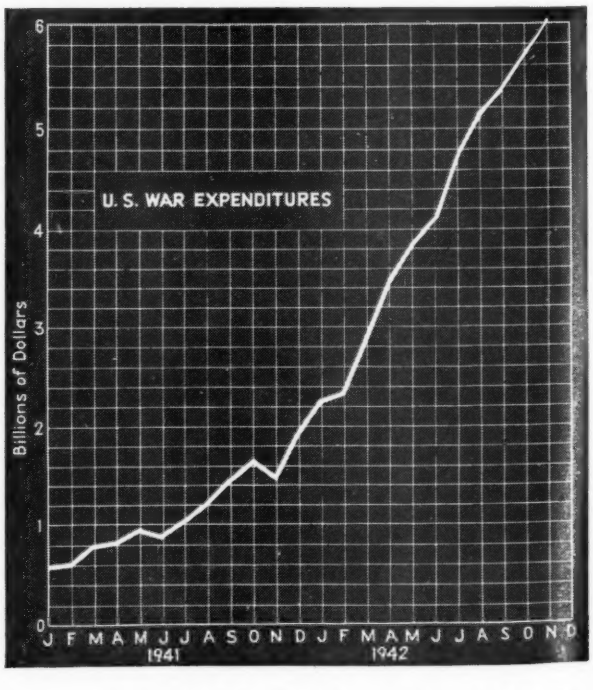
Prefabrication To Increase The 21,000,000-ton merchant shipbuilding program for 1943 poses another production problem of enormous magnitude. Increased emphasis will be put on prefabrication away from the shipyards. Production of propulsion machinery, mechanical plant and other ship equipment will be distributed to every line of manufacturing that can take on such parts and components. Great pressure is being exerted, of course, to enlarge as rapidly as possible the building of escort vessels, of which there is a critical shortage.

Tool Production Still Near Peak Machine tool production continues near an all-time peak, though backlogs are shrinking. Cancellations are still high. Some of them can be traced to a screening-out of orders placed at a time when overbuying, as a protective measure, was prevalent. Others are caused by the cutting back of manufacturing schedules on many war products. Still others spring from a desire by contractors to shift orders to companies that can make earlier deliveries. The result of the current trend is to put many machine tool builders into a position where they are booked solidly ahead for only a few months.

Confused by Multiple Orders Confusion regarding machine tool requirements has arisen from misinterpretation of requests by the WPB production division for a roundup of government agency requirements for certain critical components. These agencies revamped the request and sent it to all contractors, resulting in widespread misunderstanding. At first, the opinion was that machine tool builders would be deluged with a flood of ill-considered orders, just as they were in March of 1942. This fear, however, has not been sustained by resulting events.

Won't Make Big Pool Orders Reports of pending large pool orders for machine tools are unfounded. WPB policy is to build no new plants unless needed capacity cannot be worked out in existing production facilities. As machine tool builders begin to taper off on their regular products, it is Washington's plan for them to produce parts for some of the most critical lines of war weapons. The great upswing in output required in these critical lines will call for all the country's machining capacity.

Production Goes Upward War production generally is climbing to the peak which Washington looks for in the spring. There is bound to be a lot of shifting around as momentarily the military demand for one product overshadows that for another. That is why operating schedules in war plants will vary from week to week or month to month. As the need for raw materials, including steel, eases in certain war lines, it will increase in others. Thus any release of new tonnages to civilian goods manufacturers, over and above those already allotted, is out of the question just now.



Tripled Preceding Year — War expenditures by the U. S. Government in '42 totaled $52,406,000,000. This was 3.8 times the $13,895,000,000 spent in '41. Checks cleared during the 310 business days of '42 averaged $169,100,000 daily. December expenditures increased 0.2 percent over November

Intra-WPB Dispute Results in a Confusion of Orders

Differences between v. chairmen Wilson and Eberstadt—production scheduling vs. material allocation—leaves producers groping in a haze of conflicting orders

BY ROBERT COLBORN

WASHINGTON—War goods manufacturers went through some pretty bad days late last month when they received instructions, some from WPB divisions and some from government procurement agencies, to place orders with suppliers immediately for all of 32 types of scarce parts on which they wanted delivery during the first half of 1943. A deadline of Feb. 6 was set for getting orders on to the suppliers' books, with the clear intimation that orders which missed the deadline would have trouble getting filled.

The deadline caught most manufacturers completely unprepared, and the instruction reached them, in most cases, only ten days before the deadline. Moreover, when they tried to place the orders, they found many parts suppliers refusing to accept orders unaccompanied by a preference rating. First quarter PRP ratings were generally available, but PRP regulations place restrictions on advance ordering. Firms which, in this quandry, appealed to WPB for advice were sometimes told to disregard the PRP rules, sometimes to disregard the Feb. 6 deadline.

Caught in the Whirl

It's no consolation to bewildered business men that they are merely innocent bystanders in a bitter intra—WPB dispute in Washington. Partly it's a dispute between two strong and able men — production Vice Chairman Charles Wilson and Program Vice Chairman Ferdinand Eberstadt.

More significantly, it's the flare-up of a long-standing battle over the best mechanism for controlling the operations of a war economy that's roaring along with the throttle wide open and the governor disconnected.

Scheduling is Winning

In catchwords, the issue is production scheduling vs. material allocation. Donald Nelson's transfer this month of jurisdiction over the aluminum division, the facilities bureau, and five industry divisions from Eberstadt to Wilson marks a shift in emphasis toward scheduling as the principal control mechanism.

The dispute dates from last fall when WPB was in the throes of evolving the Controlled Materials Plan. At that time the manufacturing industries were arguing for a pure scheduling system. The material producing industries, on the other hand, wanted a pure material allotment scheme.

The Controlled Materials Plan, as it emerged from the scrimmage, combined the two plans—side by side. But under Eberstadt's leadership the emphasis in CMP has been thrown more and more toward the passing around of allotments, the bookkeeping of material supply. Until the last few weeks, the business of preparing and coordinating production schedules had moved into the background.

The mechanics of CMP are such that it is perfectly possible to carry through on all the formal operations without making more than the briefest of nods to scheduling.

Orders Become Schedules

Month by month schedules of finished munitions have been prepared; in some cases the scheduling has gone as far as major sub-assemblies—such as engines and propellers for aircraft. But for the vast mass of parts and pieces scheduling has gone no farther than a half-filled order book with final delivery dates in it. The definitive CMP regulations, when they came out last month, explicitly legalized treating such an order book as a schedule.

The general absence of detailed scheduling was clearly revealed by the directive requiring manufacturers to get their orders for critical components on the suppliers books by Feb. 6. This would have been easy if requirements had been scheduled in advance.

Was Planned That Way

The revelation was no accident; Wilson planned it that way. The one sector of the war job on which Wilson had got a firm grip was stepping up the production of the 32 critical components (AM, Feb. 4, p. 112c). An essential part of that job is putting the component-producers on firm schedules —and this means finding out how many of the various components are needed. Right now, no one knows, and the only way to find out is to force the orders onto the manufacturers books. That is why Wilson set the Feb. 6 deadline. But at the same time, he's aware that the critical components occupy a strategic spot in the economy, entering into thousands of kinds of goods, and he welcomes the chance to enforce scheduling up and down the line by demanding the figures on requirements for his components.

Industries and WPB Are Having Difficulties Getting Controlled Materials Plan Rolling

WASHINGTON—Metal-working industries have been disturbed in recent weeks by a growing awareness of the more or less inevitable (AM, Dec. 24, p. 1528i) difficulties attendant on the introduction of such a sweeping plan as CMP. A prime difficulty is that large sectors of industry still have only the vaguest notion of what is expected of them. Their confusion hasn't been lessened by the gradual, hesitating way in which decisions have been made and rules issued as to the mechanics of the plan. Industrialists have found it difficult to get clear and authoritative rulings on many detailed, but to them vital points.

Classification is not Stable

One of the sorest points has been the decision as to whether particular products fall into Class A or Class B, a point which affects nearly all a manufacturer's operations under the plan as well as those of his customers. Just a few days before the Feb. 9 deadline, many firms were finding themselves tossed back and forth between the classes almost at an hour's notice.

Theoretically, no great harm is done if a particular firm is unable to get under CMP in the second quarter because of such difficulties; it can get its materials under PRP. However, CMP allotments take precedence over PRP allocations. The simultaneous operation of CMP and PRP creates some danger of over-allotment, so the PRP customer may find the cupboard bare. And even if this does not happen, CMP customers are served first and he is likely not to get, until late in the quarter, materials he needs to have early in the quarter.

May Force a Dress Rehearsal

It may yet prove necessary to do what some business men are now suggesting—make PRP allotments equal in value to CMP ones. In effect, this would make the second quarter operation of CMP a practice-go-round to work the bugs out, leave its real operation until the third quarter.

Wilson's victory in getting control over more of WPB will not solve many of these difficulties; no changes in the mechanics are now contemplated. Assignment of the aluminum division to him puts the aircraft program—from ingot to test flight—under single control and should quiet the squawkers.

A.S.T.E., Acceding to Demand, Will Hold Exhibit at Meeting Featuring War Efforts

DETROIT—Reversing its previous decision, the American Society of Tool Engineers has authorized the holding of a 1943 machine and tool progress exhibition in connection with its annual meeting in Milwaukee, March 25-27.

This action was taken as the result of demand for a show, arising primarily out of the current urgency for simplifying the nation's war production job, due to the increasing introduction of unskilled labor, the greater acuteness of the industrial manpower situation and the coincident need for further increases in production schedules while conserving materials to the utmost.

The exhibition will be somewhat smaller, purposely, than previous A.S.T.E. shows, in order to permit eliminating any exhibits which do not bear directly on the immediate job of expediting war production.

The exhibition is scheduled to be held in the Milwaukee Auditorium, as will be the technical sessions of the society. Standardized booths in A.S.T.E. blue and gold colors are being supplied exhibitors, who are being urged to keep exhtbits as simple as possible.

Discourage Heavy Displays

Explaining that the annual meeting arrangements are being made in cooperation with the program of the Office of Defense Transportation, A.S.T.E. President Otto Winter announced "We are discouraging the exhibition of items of heavy equipment which would have to be shipped to Milwaukee. In their place, we are recommending that exhibitors provide adequate photographs and literature on such new heavy equipment.

"Our check of tool engineers indicates," he continued, "a desire for a rapid survey of new equipment such as tools, accessories, production processes, smaller machines, materials, etc., which are currently available to simplify the war production job. The introduction of considerable amounts of unskilled labor, particularly women workers in industrial plants, makes it highly essential that considerable tooling be revised to provide either more automatic or simpler or more fool-proof production processes."

Annual Meeting Details

The 1943 annual meeting of the A.S.T.E., being held concurrently with the show, is to deal with subjects in keeping with the wartime efforts of the members. Six technical sessions scheduled for the three days of the meeting will be symposia on such subjects as "Women in Machine Shops," "Increasing Tool Life," "Tool Salvage," "Machining of NE Steels," "New Production Techniques," and "Tool Engineering Horizons."

Among the various subjects which will be discussed to a considerable extent are the new problems created by increased mass production of both ferrous and non-ferrous aircraft parts, the use of plastic tools, glass plug and ring gages, application of induction hardening processes, and new developments in welding to simplify war production. The theme of each session is "Here's How to Know How." The technical sessions will be held at the Milwaukee Auditorium.

Contra-Draft Pressure May Ease Employment Problems

Strong pressure developing in Congress to put a crimp in the military plans to have some eleven million men in the armed forces by the end of the year has caused a good many employers to modify their ideas on the replacement problem they face. Since the speed-up in induction rates last fall, most firms with their eyes open have proceeded on the assumption that by 1944 they would lose nearly all of their physically fit men of military age—non-war industries first, but war industries too. Now many are swinging to the belief that they have been over-pessimistic.

A cut in the Army induction program will undoubtedly ease the situation, but it is easy to exaggerate the effect of any likely cut. Thus, if the schedule is reduced by something like two million men, it would eliminate the necessity of calling many men with children, but would leave most married childless men slated to go.

Too, moves in the last month or two to exempt various particular classes of men increase the pressure on everyone outside those classes. Thus, the reduction of the age of military service to 38 increased the nucleus of men that employers could count on keeping, but at the same time it raised the probability that men under 38 would go. Similarly, the virtual exemption of farm workers from the draft substantially increases the number of men who will be called from industry.

It is easy to demonstrate that—unless Army-size plans change—nearly all healthy men will be in the Army by 1944. There are about 23,000,000 men between 17 and 38, counting those already in the armed forces. Of these, not more than 12,500,000 can pass even the Army physical, much less the Army-Navy physical. Of those who can pass the physical, 1,500,000–2,000,000 are farmers and therefore draft-exempt. A few more (1,000,000?) must be deducted as representing rock-bottom industrial deferments. This leaves a pool of something like 10,000,000 physically fit men, many of them with several children, many working in war industries. From the pool, the armed forces expect to draw 11,000,000 men this year.

May Succeed in Limiting

Moves to limit the size of the armed forces are given something approaching an even chance of success. They have broad support, by no means limited to those who believe that mobilization of the nation is being carried unnecessarily far. A reduction would materially ease the embarrassing dilemma of manpower officials who face the prospect of an acute labor shortage while they are unable or unwilling to do the drastic pushing around of people which would be needed to insure the most economical use of available manpower.

Pre-Fight Testing—Two metallurgical testers take X-ray pictures of the welds on the M-4 tank Ford is manufacturing. One tester holds the plate he will place under the portion to be pictured; the other is handling the controls of the apparatus, which can be raised, lowered or tilted in any direction

INSIDE DETROIT

BY RUPERT LE GRAND

Plants step up hiring of women to fill added production needs. Regional WPB chief foresees autumn labor shortage of 100,000. Lund boosts CMP as solution to material-shortage shutdowns. Car makers eye helicopter for post-war market

Hire More Women The former motor metropolis of the world is fast becoming a city of turbaned, slacked women. And under many of these turbans are tucked the white hair of grandmothers, as the tempo of war work steps up, with less and less men to draw from and more and more taken by the draft.

Packard, with an augmented aircraft engine program on its books, is training two or three times as many women as men. Their present proportion of women to men on the payrolls is about 12 to 13 percent. It is expected to go to 30 percent.

Packard officials are not reticent about their approval of women workers in their plants. "They have done 20 percent better work than men on the jobs on which we have put them," said one high official.

Other ex-auto makers are following suit with good results. Willow Run, which loses men to the draft and to quitting almost as fast as it can hire them, is stepping up the hiring and training of women. In some departments, the percentage runs about 50-50.

Willow Run Ups its Production Willow Run, it can be said, is stepping up its production steadily despite previous reverses. The subassembly lines are filling in and while Supreme Court Justice Frank Murphy's recent prediction on the Coast that it will be turning out 500 a month by next fall seems far fetched, there is considerable improvement every month in the output of completed bombers.

One of the principal drawbacks to Willow Run's production has been the manpower situation. It must add at least 27,000 new workers by next fall. Housing and the length of travel to get to the plant still makes many reluctant to go there, despite the high pay which is being drawn by both men and women at the plant.

Foresees Autumn Labor Shortage Although right now, war plants in this area are not worried about manpower shortages, War Production Board officials are wearing deep frowns as they view the future. D. J. Hutchings, regional director here, estimates that the 29 major plants in this area will be shy over 100,000 workers by next fall if the production peak is to be reached. Where they will come from is anybody's guess. He advocates that labor devote ten percent more time than heretofore.

The drawback to this suggestion is that maldistribution of orders and materials at the present is holding down some plants to a mere five day operation while in some it is allowing seven day operation in some departments and only five in others, causing unrest among the workers. The workmen have begun to count their overtime as part of their regular pay and when they fail to get it, become very dissatisfied. Several work stoppages in Detroit plants have been due to this trouble.

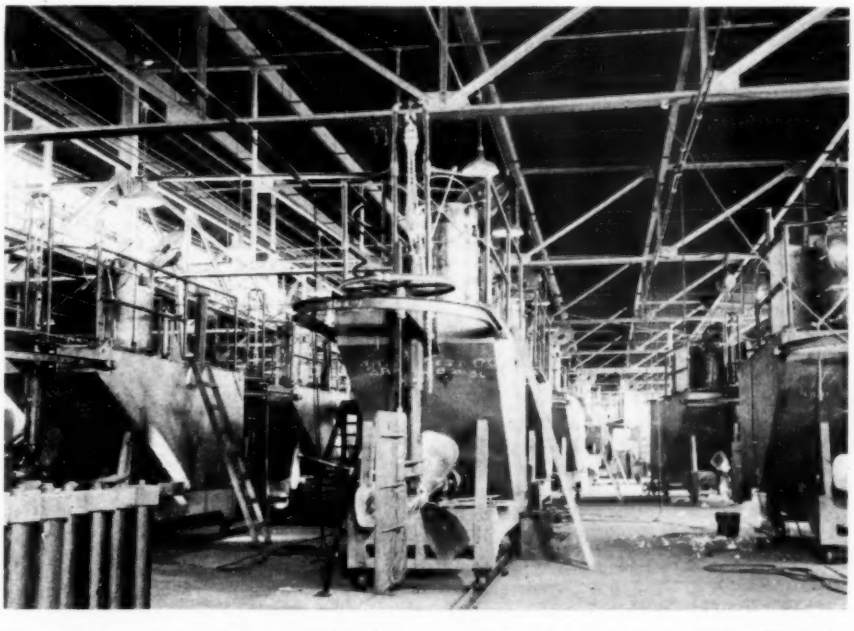
Blames Material Flow for Loss Wendell Lund, WPB labor division director, made a trip here to iron out the situation. He said it was one of a number of similar meetings he was holding in war centers.

Nevertheless, Lund's visit was given a great deal of importance by the local Office of War Information. He met with 75 Michigan CIO and AFL leaders to take up the matter of absenteeism.

Lund agreed that bad distribution of materials, as well as poor housing, transportation and health contribute to absenteeism and promised that the Controlled Materials Plan, which is being put into operation, will help solve the materials problem. He predicted less interruption in production when the CMP starts operating.

Lund blamed irregular flow of supplies rather than strikes for time lost in production last year. He said that strikes accounted only for one percent of output losses. The upshot of his visit was the appointment of six labor chiefs to act as a labor policy and advisory committee to meet with Hutchins. It was a partial answer to labor's accusation that it did not have representatives sitting in with WPB heads.

WMC Situation Still Cloudy Meanwhile, the War Manpower Commission here is still in the dark on the "Work or Fight" edict issued by Paul McNutt. The list of non-deferrable occupations is definite but the question is what occupations are essential? This has not yet been answered and has left many workers uneasy. Montague C. Clark, WMC director for this region, vaguely promised an early statement clearing this up and hurried off to Cleveland for a parley with other manpower chiefs. Thus far,



Sea Mules—From the assembly line of the Kercheval body plant, Chrysler Corp., large numbers of marine tractors or "sea mules" have been delivered. This unit can be attached to any barge, scow or other flat-bottomed cargo carrier to give it independent locomotion. Rudder and propeller can be raised or lowered. Motive power is an eight-cylinder Chrysler marine engine

the situation has not been cleared up.

Labor leaders here, however, see the "Work or Fight" order as little solution to the coming labor supply problems. They estimate that at the most it will affect about 27,000 in the non-deferrable categories set up by Washington. They point out lots of loopholes through which many of the non-deferrables can still escape, such as classing a bartender as a waiter serving food to war workers and therefore essential.

Auto Makers Like Planes Whether it's the touch of spring in the air or the feeling of coming victory for our forces, auto executives have been more inclined lately to talk about the post-war period. Where once they brushed off all inquries about what was coming because "we're too busy winning the war to talk about the future," it seems some have thoughts in the backs of their minds what they might do.

One company, with a good automotive background, has been getting experience in the airplane field which they are considering using come the day when they go back to peace work. Part of its aviation contract has been shot out from under it by what their executives believe to be sharpshooting on the part of rival plane producers. But the company still has had a taste of that work and seems to like it.

Like Helicopter for Post War This particular company has its eye on the helicopter which Igor Sikorsky boosted so glowingly in a movie-illustrated talk about a month ago. It is surprising how much talk Sikorsky created among auto builders and this is evidence that it was not idle curiosity in some cases. A high official of the auto manufacturer said it was considering the possibility of building the helicopter in volume after the war—providing some changes are made, such as stepping up its speed.

Most auto builders agree that the post-war car—the one that comes after the immediate market is satisfied with 1942 models—will be a lighter car and a cheaper one. But they also agree it will be some time to bring both factors into the picture. They estimate that today's cars would cost 20 percent more to build because of labor costs. What this will be after the war and what can offset it, none can predict.

But one thing: None sees aviation as a threat to autos for some time. "They would have to change the structure of cities," they argue.

Chilean Choo-Choo—The shipment of nine 40-ton locomotives, like the one pictured here, brings to 70 the total of General Electric units hauling trains in the nitrate fields of Chile. Each of the recent shipment is equipped with four 75 hp. motors with forced ventilation and single station full magnetic control with dynamic braking

WAR RULINGS IN BRIEF

Checklist of Significant Regulations on Materials and Prices

ABRASIVES—To simplify price controls over coated and bonded abrasive products OPA has announced regulation maintaining prices at level of March, 1942, but meeting particular pricing problems of this industry.

CONTROLLED MATERIALS — Acceptance of deliveries after April 1 is prohibited if delivery would increase inventories beyond the prescribed limits. Scheduling provisions require that every user apply for allotments, schedule deliveries, and place orders in such manner that deliveries may be made to him without violation of the regulation. (CMP Regulation 2.)

DIE-CASTING—A certification plan in this industry provides a method whereby metal used in special high quality zinc and aluminum die-casting of ammunition components and other critical parts are subjected to rigid inspection.

IDLE MATERIAL—An official interpretation of Priorities Regulation 13 points out that certain recent orders affecting specific industries refer to paragraph (c) (3) of the regulation and provide that special sales of materials may be made to others in the same business as the seller. This reference to paragraph (c) does not remove the materials affected from other provisions, including reporting requirements of any redistribution program. (Interpretation 1, Priorities Regulation 13.)

LIGHTING EQUIPMENT—Production of non-approved types of such equipment for airports and seadromes has been stopped. The order also centralizes procurement under joint control of the Army Air Forces Materiel Center and the Navy Dept., or as otherwise specified by WPB. (Order L-235.)

OFFICE FURNITURE—No relaxation of the order is contemplated for the manufacture and delivery of such items, and no revision in the order has been made. (Limitation Order L-13-a.)

TUNGSTEN—The points themselves have been released from allocation because they are more easily controlled through allocation of the tungsten rod to manufacturers.

Booklet Details Company's Place in the War Effort

ROCKFORD, ILL.—"A tribute to the sweat and toil, the determination, and the skilled hands of every Greenlee worker," such is the dedication George C. Purdy, president, Greenlee Bros. & Co., has given to "Greenlee at War," the 24-page booklet recently published to give employees "a better understanding of the importance of the work they are doing."

Published in two colors and black and replete with illustrations of the manufacture and use of Greenlee products, the publication emphasizes the theme, "The war on the fighting front will be won only by first winning the war on the production front."

Included is a short history of the company, from its establishment in 1866 to the present. Pages are devoted to pictures of the "E" award ceremonies, to the various products Greenlee manufactures, to the administration of the company and to the organized recreational activities of its employees.

The rear cover is imprinted with a red-bordered shield bearing the names of men who have left company employ to enter the armed forces.

Wichita City Library

WARTIME WASHINGTON

BY BLAINE STUBBLEFIELD

As Axis European airpower wanes, U-boat menace to our shipping lines grows and is hard to solve. Machine tool plants may be converted to component manufacture, though they'll have to re-tool. Draft reduces manning table interest

Planes Weaken, Subs Strengthen European Axis air power is now far inferior to that of the combined forces of Russia to the east and Anglo-American forces to the west and south. Axis land power has the blind staggers from blows delivered by the Russians. Hitler's newest hope of eventual victory, or at least defense of his European "fortress," is stepped-up submarine attack on the rising flow of food and clothing and weapons from the United States.

Most Dangerous of Weapons The submarine is still the most formidable and unmanageable weapon in modern warfare, barring none. Hitler, as Churchill says in his latest speech, may greatly prolong the war with his U-boats, which he can build in scattered and undiscoverable pens all around Europe and in the Baltic Sea. Much depends, of course, upon Anglo-British production of escort vessels, which now have right of way over all priorities, and of which several hundred are scheduled for 1943. But the statistical score board shows that Hitler's only hope can be prolongation of the war, which after all, from the Nazi leadership's point of view is a laudable enterprise, since Churchill swore he would toss them all to the Poles and Czechs and Russians.

Too Close for Comfort In his speech Churchill reveals for the first time since Pearl Harbor the statistical relation of Allied shipbuilding to Axis sinkings. He said that in the last six months Allied building exceeded sinkings by 1,250,000 tons. That is a fairly narrow margin. It is about 125 ships of the Liberty type. It means that, numerically, the Axis has sunk more ships than Britain and the U.S. have built, for many of the sunk ships are small. But tonnage is what counts.

But We Can See Hopes Axis sinkings during the last two months have been very low, but that is because of stormy weather, which bothers submarines. When spring comes they will go at it with a will. But U. S. shipbuilding, alone now just over a million tons a month, will exceed two million tons a month before the year's end. Escort boats will be after them and we will have so many long range patrol bombers that we can practically hold an umbrella over our Atlantic supply lines.

Another Ocean, Another View In the Pacific, we look at the submarine picture from the other side, for in that ocean our subs are putting the tin fishes into Jap ships at a rate in excess of their building rate. Their conquests and their existence depends upon merchant ships. Our subs and our torpedo and bombing planes have already done in about one-fourth of Jap merchant shipping.

CORRESPONDENTS' PRESIDENT

WASHINGTON—The White House Correspondents' Association recently elected Paul Wooton, Washington correspondent of AMERICAN MACHINIST and other McGraw-Hill Publications, as its president. Mr.

PAUL WOOTON

Wooton has served the organization for several years as its secretary and treasurer.

The rolls of the White House Correspondents' Association are open to accredited correspondents covering the agencies of the executive branch of the Government. Only members may secure a White House Correspondent's card. Through controlling its own membership, the Association restricts attendance at the President's press conferences to correspondents who make actual use of the news material developed at those conferences.

May Convert to Components The War Production Board is considering the conversion of some machine tool plants to ordnance components. The Board's officials believe that, as the facilities program narrows down, machine tool producers will catch up quickly with their backlog, and that some of them will be available for end products.

Tool builders have already been consulted about specific components. One of them is aircraft engine superchargers. Many other similar high precision items must be on the list. One of them could be gyro airplane controls, or the bomb sight. The expansion of war equipment is definitely toward airplanes and merchant ships and certain naval craft. You can figure out a list for yourself.

Accurate, but not Speedy Machine tool plants can make almost anything involving the machining of metal. But first, they have to make or buy equipment for the specific purpose. Machine tool plants are not of the mass production type, and therefore they cannot usually make components in large numbers, and they cannot make them cheaply.

Some producers are of the opinion that the whole machine tool outlook may have been misunderstood. They say that because of the continuing loss of skilled men, some machine tool plants, and some end products plants, may have to cut back to two shifts. At any rate, the machine hours per week almost surely will decline. This trend, in their opinion, may mean that there will have to be more machine tools, and more machines in war production plants, rather than less.

Draft Chances Cut Interest The current uncertainty about draft prospects (p. 136c) may be one reason why industry is not showing any overwhelming interest in the "manning table" and "replacement schedule" schemes for organizing draft deferment which were introduced late last year. Both the Selective Service, which handle the replacement schedules, and the Manpower Commission, which passes on the more elaborate manning tables expected, initially, to be swamped with work. In fact, WMC carefully included a provision enabling it to pick and choose which firms' manning tables it would look over. As it turns out, neither agency is being overloaded.

Authorizes Transfer of Idle Machine Tools When Tool Deliveries Fail to Meet Demand

Transfers of idle machine tools to plants urgently needing them are authorized under a policy established by the War Production Board in consultation with the War and Navy departments and the Defense Plant Corporation. This step was recommended by the Production Executive Committee, under the chairmanship of C. E. Wilson, production vice chairman.

The War Production Board, through its Tools Division, will direct the procurement agencies to transfer available tools when new tools cannot be delivered quickly enough to meet requirements. The directive points out that most machine tools purchased for war production have been financed by the government. It is primarily toward the use of this equipment that the WPB's order is directed.

Cuts Need for Reserves

The swift transfer of machine tools to those who most need them, the Directive indicated, will make it unnecessary for contractors to retain reserves against future needs. The policies established, it is believed, will result in "sufficient fluidity and flexibility in the distribution of machine tools to make such reserves wholly unnecessary."

The directive stated that the "guiding principle shall be that upon the issuance of such a direction the transfer of the machine tool question shall be made promptly." Consequently, the directive continued, "every effort must be exerted by the governmental agency concerned to obtain the consent of the holder of the machine tool to its immediate transfer."

Take First, Talk Afterward

Negotiations to modify contracts under which the tools are used, or contracts covering production involving use of the tools, are to be conducted after the transfer as far as possible.

If a voluntary transfer cannot be accomplished promptly, steps will be taken to requisition the machine tools in question.

Government procurement agencies concerned with machine tools are to collect lists of machine tools which are "available for transfer to fill other more urgent needs." The information will be given to the WPB, Tools Division. Transfers then will be directed, after consultation with other agencies, by the division.

Orders for outstanding machine tools are to be reviewed "so that those not urgently needed may be cancelled." On December 31, officials pointed out, the average time needed to complete outstanding orders was 6½ months.

FOREMEN TAKE LUNCH SHIFT

NEW YORK—Because men need at least one-half hour to eat and rest on any eight hour shift, most war plants have found it practically impossible to attain more than 22½ hour operation daily of any one machine.

Irving Subway Grating Co. has solved the problem by having foremen and gang bosses take over when regular operators leave seven ponderous 100-ton crimping machines. Production has increased by seven percent since this method of achieving peak machine efficiency was initiated throughout the three shifts.

Orders Expected to Hasten Shifts to Essential Work

The War Manpower Commission undertook two broad moves this month to accelerate transfer of men from non-essential into essential industries. It used the draft as a nudge by declaring that men doing specified non-essential work after May 1 would be drafted, dependents or no, unless they moved into other work. And it attempted to release extra men from non-war industries by an order aimed gradually to convert all firms in labor shortage areas onto a 48-hour week.

The 48-hour week order, as watered down by the Manpower Commission, is a useful though minor tool in the hands of WMC regional directors. But it's nothing like the startling innovation that its first announcement made it sound. Point is that the policy is to be applied only in designated labor shortage areas—32 of them so far. In these areas, a work week of at least 48 hours is already nearly universal, in civilian as well as war industries. The new order will merely enable WMC to deal with the occasional exception, may have its biggest effect among white collar workers, driving a few more of them into the factories.

Housing Affects Manpower

Drastic effects of the order would have come if it had been applied to the areas where there is no labor shortage. But this couldn't be done. The drastic effects would merely have been to increase the unemployment rolls. No one has yet licked the problem of moving large numbers of workers into a shortage area where housing and municipal services generally are already hopelessly overcrowded.

Even in those cases where the order applies, it does not require anyone to work a 48-hour week. What it does is forbid any firm which is not working its employees 48 hours to hire any additional workers without specific WMC sanction. Over the long haul, of course, this means that a short-hours firm will have to lengthen its working hours gradually as normal turnover reduces its labor force. Until March 31, even an employer who patriotically wants to go to 48 hours is not supposed to take the obvious step of laying off any of his men except as WMC can find jobs for them.

Differs from C.I.O. Plan

The order bears only a superficial resemblance to the 48-hour week scheme advanced last month by the C.I.O. Reuther's proposal called, essentially, for a guaranteed weekly wage, was intended to ensure that if a war plant slowed down because of lack of materials or the like it would go right on paying full wages. There is nothing to compel such action in the President's order.

The new draft order lists certain non-essential industries—jewelry manufacturing, gambling, etc.—and certain non-essential occupations — bartenders, porters, bootblacks, etc. Any man between 18 and 38 who is working in a non-essential industry or at a non-essential occupation in any industry is declared to be "non-deferrable." This means that, no matter how big a family, how many dependents, he may have, he will be drafted into the Army at once unless he changes jobs by May 1.

Is Causing Shift

Something under a million men are affected immediately by the order. Many more, however, are influenced by it. The WMC has announced that it expects to list more non-deferrable occupations, and hundreds of thousands of men in occupations they know to be on the borderline are being stimulated to look for a job having some relation to the war.

Concretely, what the order means to men who insist on staying in non-deferrable occupations is that, if they are healthy, they will be drafted six or seven months sooner than otherwise. They would probably be drafted anyway before the year is out.

Pamphlet Instructs Women In Handling Power Trucks

CLEVELAND—The use of women as operators of power industrial trucks is not only possible, but is an existing fact in many plants, according to the findings of a recent survey. To expedite the training of women for this work, the Elwell-Parker Electric Co., sponsors of the survey, has produced a pamphlet that offers instruction in clearly understandable style.

Not only does the pamphlet furnish detailed instructions on how to handle a truck, but it also emphasizes the important contribution a woman may make toward winning the war by doing a first-class job and taking good care of her machine.

THE AIRCRAFT HORIZON

"Tailor shops" seek to aid steady flow of planes. Aluminum and steel forging still a bottleneck. Program for 1943 calls for a quarter more—and heavier—planes

To avoid shutting down aircraft assembly lines for change orders (which come in so fast that sometimes only five or ten planes of a series would be made alike) modification centers have been established at various points in the United States and abroad. Planes are ferried into these centers to be altered and fitted for special tasks: on the desert, in the tropics, in the arctic. They are called "tailor shops." These tailor shops accomplish their purpose. The assembly lines can run off hundreds of identical models. But the modification centers themselves are beginning to eat up man-hours badly needed in the aircraft plants. Some jobs take thousands of hours per unit.

The December output of planes is revised by Nelson's report, to 5,489. This included quite a number of units in the pool—which includes planes received by procurement agencies but not flown away. They are not flown away because they lack propellers, wheels, instruments, or something of the kind. Sometimes they are pooled merely because of bad weather. In early January the pool was getting back to normal, after having been stacked up for a while. Airframes are no longer immobilized for lack of engines. Engine production is running far ahead of airframes. Materials are being diverted from the engine plants to the airframe producers.

Still a bad bottleneck is aluminum and steel forgings and various aluminum shapes. This has been true for months, and there is no explanation why the situation cannot be cured. In general the tightness in materials is in partial fabrications, not in ingot. In general too, the flow of government furnished equipment is more satisfactory than manufacturer furnished equipment. The line of demarkation between these two classes of components is purely arbitrary. The government takes control of instruments, propellers, tires, or the like, for any one of several reasons.

It is hard to realize that almost half of the war productive capacity of this country, measured in dollars, has been turned to the production of airplanes. Even more plants may be converted before we are through, such as tank and truck and artillery and antiaircraft gun plants. Conversion of the Mack truck plant at Easton, Pa., was an example of a trend. This plant was put to making Vultee torpedo planes. Even some machine tool plants have been asked if they could produce superchargers, or propeller assemblies.

The airplane program for 1943, unofficially, is 125 percent of 1942. This estimate is based on numerical figures. In tonnage, it is much larger. Most of the 1943 planes will be much heavier. This makes the job even more difficult than the 125 percent figure would indicate. What with change orders coming faster and faster, and with component parts problems and manpower trouble and absentees worrying everybody, top men are doubtful if the industry can produce it bogey. Whether it does or not, it will have done a good job, and will have hit the enemy hard.

Portable steel runways, one of the innovations of this war in the air, have demonstrated their effectiveness in Africa. By laying these steel grids in two directions from center, it is possible to provide a field 150 by 3,000 feet in less than 48 hours, not including whatever grading may be necessary. The runway is designed so that the sections hook together. They are of varying weights. The great problem, of course, is that they weigh up to huge tonnages for shipping.

The Packard Company's Rolls-Royce engines have been making regular flights over Germany in four-engined Lancasters. Commander L. S. Lee who led the first attack said the engines performed beautifully. The American Rolls-Royce has been in the Curtiss-Wright P-40F Warhawk for some time.

ASSURES COLD STARTS

EAST HARTFORD — A practical method of starting airplane engines in sub-zero temperatures has been developed by engineers of Pratt & Whitney Aircraft division of United Aircraft Corp., working in conjunction with Buick and Texas Co. engineers. Now in daily use in the Northwest, the starting system makes use of a simple apparatus built of elements that are readily available. The unit is mobile and can be moved from one plane to another with ease. The equipment requires no change in standard equipment already installed on the plane.

Tested and Approved—Calling factory flight tests of the new Curtiss A-25 dive-bomber "very successful," Test Pilot Harvey Gray, manager of flight operations in a Curtiss-Wright Corp. plant, emerges from the cockpit just before delivery to the U. S. Army Air Forces. The new A-25 has greater speed, range and striking power than any dive-bomber now in action. It is a two-place, mid-wing monoplane powered with 1,700 hp. Wright Cyclone engine and equipped with a three-bladed Curtiss electric propeller and retractable landing gear

Day of Rest in Work Week Cuts Over-Time Requirement

WASHINGTON—Over-time for the seventh consecutive day of work may be paid only where all seven days fall in the same work week, according to the Secretary of Labor's second interpretation, dated February 4, 1943, of Paragraph I A 1, Executive Order 9240.

"Although seven consecutive days are worked, if a day of rest is afforded in each work week double time is not required by Paragraph I A 1. A work week consists of seven days starting with the same calendar day each week.

"This will permit, without penalty payment, the use of various work schedules which facilitate maximum production and still afford proper days of rest. It will, however, by the requirement of double time discourage work schedules which do not allow a day of rest each week and thereby impair health and efficiency and maximum production."

Attributes Democracy's Strength to Individuality

LATROBE—The importance of citizen interest in local government was stressed in a recent address by Roy C. McKenna, president, Vanadium-Alloys Steel Company.

Democracy "is the best form of government devised by man and we have serious doubts that any 'planned economy,' however efficient, would lead to national welfare. We are willing to sacrifice not only our comforts and conveniences, but our liberties, for the duration. That Democracy is inefficient and wasteful is due in no small part to the fact that we as individuals do not take sufficient interest in local politics," said Mr. McKenna. Lacking this interest and support, elected representatives are subjected merely to the influence of bureaucrats and representatives of pressure groups.

Fellowships Out for War; Talent Search Continues

EAST PITTSBURGH—The Westinghouse Electric and Manufacturing Company has discontinued for the duration of the war the Research Fellowships awarded annually during the past five years to enable leading young scientists to continue their studies at the company's research laboratories, here. Pure research, as such, is being pursued only in instances where it helps the war effort.

Company officials stated the ability of its research laboratories to contribute to the war effort is partly restricted by a shortage of highly trained men. Accordingly, correspondence is welcomed with men who in better times would be interested in Westinghouse Research Fellowships. It may be that some of these men can find their best opportunity to aid the war effort by joining with those now fully engaged at Westinghouse in developing new devices and new material for the armed forces.

Talent Search to Continue

Completed examinations and other data, on which will be based the Westinghouse Science Scholarship awards, is in the hands of the judges at Washington. Judging is expected to be completed and the results announced within a few weeks. Scholarships awarded on the basis of aptitude examinations given teen-age seniors in public, private and parochial schools, will enable the top-ranking contestants to prepare for future careers as American scientists.

NAMES in the NEWS

James R. Hewitt has been named vice president of the American Manganese Steel Div. of American Brake Shoe and Foundry Co., Chicago.

George H. Adams has become executive vice-president of Bunting Brass & Bronze Co. of Toledo. He joined the firm in 1928 as sales director, and his new responsibilities include the supervising of manufacturing, sales and research operations.

F. B. Lounsberry, vice president in charge of manufacturing for all plants of Allegheny Ludlum Steel Corp., is making his headquarters at the general offices of the company in Brackenridge, Pa. Mr. Lounsberry has been in charge of manufacturing for all plants of the corporation since the middle of last year, and prior to assuming his present duties he was vice president and operating manager of the Dunkirk and Watervliet, N. Y. plants.

R. E. W. Harrison, vice president of Chambersburg Engineering Co. Chambersburg, Pa. since 1934, and a member of the firm of Clarke-Harrison, Inc., Philadelphia, has been recalled to active duty in the office of the Under Secretary of the Navy. Commander Harrison will serve directly under Admiral H. G. Bowen.

Harvey H. Brown, Jr. has been elected president and treasurer of Cleveland Hobbing Machine Co. at the company's annual meeting. He is a director and member of the executive committee of Eaton Mfg. Co., a director of Enamel Products Corp., Industrial Brownhoist Corp. and several other firms.

W. A. Hayward has been appointed executive vice president and manager of Intercontinental Aircraft Corp., a subsidiary of Vultee Aircraft, Inc.

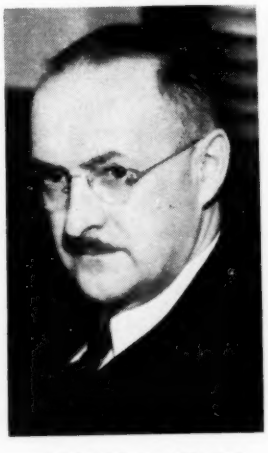
I. H. Anderson has been named district manager of sales for the Steel & Tubes Div. of Republic Steel Corp. in New York. He began work at the Cleveland plant of the company in 1927 as a sales apprentice and was the first graduate of the sales apprentice school. Mr. Anderson has been associated with various district offices of Republic, and has been located in the New York office for the last six years.

Walter E. Chollar, deputy director of the Facilities Div. of WPB, has been relieved of his duties in that office to return to active work as vice president of Remington Rand Co. in order to devote his time to the extended operations of his company in aircraft work.

Leon E. Jeanneret, formerly assistant general sales manager of Babcock & Wilcox Tube Co., Beaver Falls, Pa., has become manager of sales of the Welded Tube Div. of Babcock & Wilcox Co. with general offices at Alliance, O. Edward A. Livingstone, general sales

Occupy New Positions as Vice Presidents — *Duties Extended*

JAMES R. HEWITT



GEORGE H. ADAMS

F. B. LOUNSBERRY

manager at Beaver Falls also has been named general sales manager of the Welded Tube Div. The appointment of William J. Thomas as assistant general sales manager of the tube company at Beaver Falls has also been announced.

Richard Calvert, sales representative in eastern and central Pennsylvania for Carpenter Steel Co., has retired after 30 years of service with the company. He is succeeded by Avard Taylor, who has been working with Mr. Calvert.

A. F. Murray has become works manager of the Electrolux Corp. plant at Old Greenwich, Conn. For the past 14 years Mr. Murray has been connected with the headquarters manufacturing staff of Westinghouse Electric & Mfg. Co.

Nelson W. Pickering has resigned as president of Farrel-Birmingham Co., Inc. of Ansonia, Conn., and has reported for active duty in the United States Navy in charge of operations of district patrol vessels in the Third Naval District at New York.

G. M. Butler, formerly research engineer in the Dunkirk laboratories of Allegheny Ludlum Steel Corp., has been named chief metallurgist in charge of technical control and research. He has had wide experience in the field of special steels, and previous to his connection with the corporation he was associated with the U. S. Bureau of Mines and Climax Molybdenum Co.

A. F. Dobbrodt has been appointed southern district manager of Carboloy Co., Inc., with headquarters at 1719 Comer Bldg., Birmingham, Ala.

Carl J. Meister has been appointed manager of sales of Atlas Metal Stamping and Atlas Tool & Designing companies, Philadelphia. Mr. Meister has been associated with the machine tool and industrial manufacturing fields for the past 18 years, and previous to his new connection he was field sales manager for Allen Mfg. Co. of Hartford, Conn.

Rowland J. Black has been promoted to factory manager of Buffalo Arms Corp. plant at Buffalo. Formerly Mr. Black had been assistant factory manager, and Don E. Miller has been named his successor in that position.

Herman Franck, general superintendent of the Dunkirk, N. Y., plant of American Locomotive Co., has been made plant manager. He became associated with the firm in 1915 and has been assigned to various plants of the company.

Robert A. Hurley has become vice president of the Narragansett Machine Co., Pawtucket, R. I. After the first World War Mr. Hurley practiced engineering privately, and later became WPA administrator in Connecticut. He served as state commissioner of public works and then as governor.

Recalled to Service

R. E. W. HARRISON

Wilson-Brown Partner

DAN HARRINGTON

Henry D. Moreland, since 1938 X-ray division manager of Westinghouse Electric & Mfg. Co. at Portland, Ore., has been advanced to the position of manager of the X-ray products, agency and specialties department and will make his headquarters at the East Pittsburgh works.

Peter N. Jansen has been named general manager of the Airplane Div. of Curtiss-Wright Corp., Buffalo. He was formerly director of manufacturing. John P. Davey, works manager at St. Louis and Columbus, has become general manager in Ohio.

Robert S. Sloan has been named welding specialist of the North Pacific area for Westinghouse Electric & Mfg. Co. He has been connected with the company since 1930, and since 1936 has served as appliance supervisor at San Francisco and Los Angeles.

E. N. Twogood has been appointed engineer of the gear department of General Electric Co. at the Lynn Works, succeeding A. A. Ross who has retired. Mr. Twogood has been executive assistant to Mr. Ross since 1923.

E. G. Hartmann has been promoted to assistant general manager of sales of John A. Roebling's Sons Co., Trenton, N. J. In 1941 he became manager of Round and Flat Wire Specialties Div.

Raymond G. Rech has been appointed assistant director of production at Bell Aircraft Corp., Buffalo. For the past 17 years Mr. Rech has been manager of the Easy Washing Machine Co. of Syracuse.

Calvert Carey has been elected vice president in charge of production of Yale & Towne Mfg. Co., succeeding Joseph A. Horne who has become chairman of the board.

Arthur M. Swigert, formerly master mechanic of Chrysler Corp., has joined the Ingles Shipbuilding Co., Pascagoula, Miss.

Brace H. Sibley, who has been associated with Champion Spark Plug Co., Toledo, for over 20 years, has been named factory manager.

Leo Edelson, who has been development engineer for Handy & Harman for the past 10 years, has become executive vice president of the Induction Heating Corp., New York City.

Paul W. Johnson, acting superintendent of the Farmall Wks., International Harvester Co., Rock Island, Ill., has been appointed superintendent. Mr. Johnson has been connected with the company since 1933 when he joined as a tool designer.

Gunnar Edenquist has been elected vice president and assistant general manager of Kinner Motors Inc., Los Angeles, and Walter G. Milka has been appointed vice president in charge of production. Both men have been associated with the company since 1929.

Paul P. Johnson has become manager of a new aircraft accessories division of Thompson Products Inc., Cleveland. Donald E. Beaton has been named general superintendent of the division.

Allan W. Fritzsche has been appointed president and general manager of General Industries Co., Elyria, Ohio. Mr. Fritzsche has been vice president and general manager since 1932.

R. C. Gray has become works manager of Robins Conveying Belt Co., Passaic, N. J.

BUSINESS ITEMS

Wilson-Brown Co. of New York City has formed a partnership, with Dan Harrington as the general partner holding the controlling interest, and will hereafter be known as the Harrington-Wilson-Brown Co. No change in the management or personnel of the company has been made.

Detroit Rex Products Co. has announced the establishment of two new offices. The north central region having headquarters in Detroit, with R. W. Pflug in charge, includes the entire state of Michigan except the upper peninsula. The south central region, comprising the states of Ohio, Indiana and Kentucky, has been established with headquarters in the Mutual Home Bldg., Dayton. W. F. Newbery is manager of this office.

Electroweld Steel Corp. is the new name for the Oil City Tank & Boiler Co., Oil City, Pa. The entire manufacturing facilities of the company are now being devoted to the production of Electroweld tubing.

American Equipment Co. of Detroit has been named representative of American Engineering Co. in the state of Michigan.

OBITUARIES

William James Harris, 68, vice president in charge of purchases of American Car and Foundry Co., New York City, passed away after an illness of a year. Mr. Harris had been connected with the firm for 54 years, having started with the Jackson Woodin Foundry of Berwyck, Pa., which was later taken over by American Car & Foundry. Mr. Harris was transferred to New York in 1920 as assistant purchasing agent, becoming purchasing agent for the entire company in 1923, and was elected vice-president in 1933.

W. W. Lewis, 55, assistant vice president of American Rolling Mill Co., Middletown, Ohio, passed away after a heart attack while playing golf with three of his associates. He joined Armco in 1917 as assistant superintendent of the open hearth department at Middletown, later becoming superintendent of the Ashland, Ky., open hearth department, and at the time of his death was general manager of the London branch of Armco International Corp.

Albert H. Reiber, 49, vice president in charge of development and research of the Teletype Corp., Chicago, died at the Mayo Clinic in Minnesota. He had been employed in sales and engineering work in the Kleinschmidt Electric Co. of Long Island City from 1920 to 1925 when the company merged to form the Morkrum-Kleinschmidt Corp. of Chicago, which later became the Teletype Corp.

W. J. HARRIS

W. W. LEWIS

J. Frederick Hartlieb, 65, died in New York City recently. He had been president of Continental Can Co. since 1939 and had been associated with the firm since 1927, having been assistant to the president; vice president in 1928; and executive vice president in 1936. His business career began with the Laidlaw Works of Worthington Pump & Machinery Co., and later he represented the company in England and on the Continent for many years.

Andrew G. Campbell, 58, superintendent of production standards of General Motors Corp., Fisher Aircraft No. 1 division, died. Mr. Campbell had been associated with the corporation since 1925, and had previously worked for the Maxwell Motor Car and Winton Motor Car companies.

John C. Koch, 59, who had been manager of Darwin & Milner, Inc., Cleveland, for over 25 years, died after a prolonged illness. He had been active in the promotion of high-carbon, high-chromium steel in this country.

John M. Hothersall, 67, retired assistant manager of equipment of American Can Co., New York City, passed away after an illness of several months. Mr. Hothersall had been connected with the organization for 39 years.

Walter L. Busch, manager of the New York department of Keuffel & Esser Co., died recently.

John G. Stewart, 64, sales manager for Stephens-Adamson Mfg. Co. in Cleveland for the past 21 years and associated with the company for 35 years, passed away.

John Kunst, 61, founder and owner of the John Kunst Co. of New York City, died at his home in Montclair, N. J., recently.

Charles J. Bender, 75, who has been president of Ahlberg Bearing Co. of Chicago, died in that city. He and Karl Ahlberg founded the firm in 1908.

William F. Senn, 72, president of the Brightman Nut & Mfg. Co., Sandusky, Ohio, passed away following a brief illness.

William L. Grimm, 59, president and treasurer of the Peerless Marine Motor Corp., Buffalo, N. Y., passed away suddenly. He had been widely known in the marine motor field and held many patents.

Oscar E. Niedringhaus, 72, president of Niedringhaus Metal Products Co., St. Louis, passed away following a heart attack. He founded the company in 1908 and was actively engaged in the business until the time of his death.

Washington Appointments

WPB, Miscellaneous:
Ernest W. Reid, deputy director general for Industry Divisions, B. C. Heacock, deputy director general for Distribution, Robert M. Keeney, deputy director General Industrial Equipment Div., W. R. Talbot, chief General Salvage Branch.

Regional Offices:
John F. McKernan, chief deputy director in charge of operations, WPB, New York City; Raymond S. McKeough, OPA regional administrator in Chicago.

Office of Defense Transportation:
Charles D. Young, deputy director, will act for Joseph B. Eastman in his absence, and will have direction and control in all matters pertaining to responsibilities of the Office as a claimant agency for domestic transportation under Controlled Materials Plan.

SHOP EQUIPMENT NEWS

Kent-Owens Large Double-End Centering Machine Is Equipped With Slings for Suspension of Work

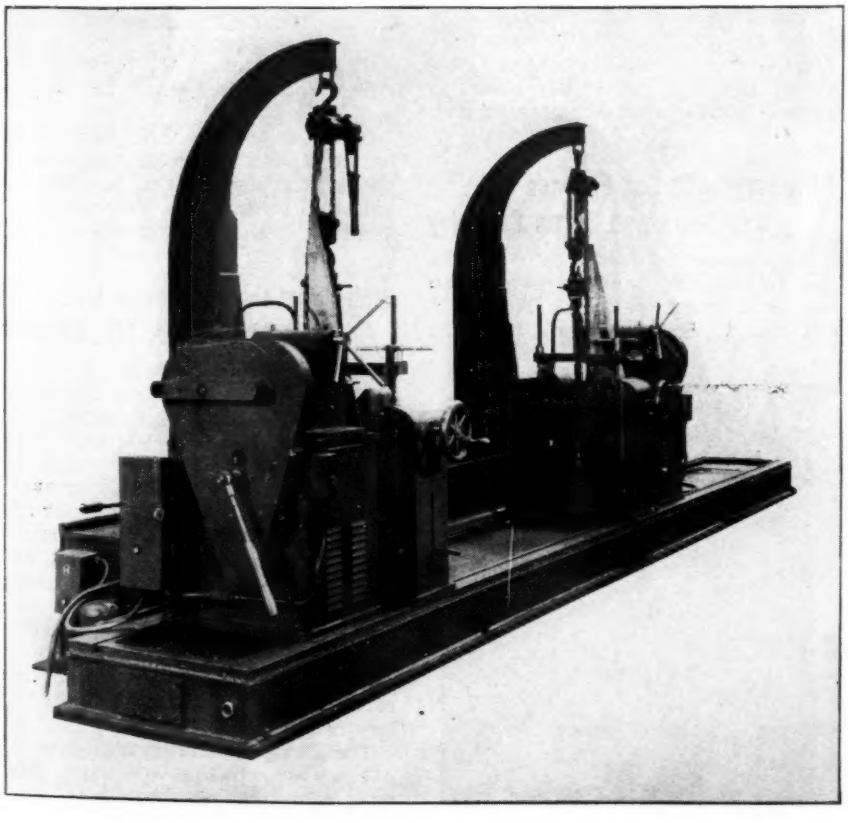
Work up to 14 in. in diameter and to 19 ft. in length can be accommodated in the double end centering machine announced by Kent-Owens Machine Co., Toledo, Ohio. With simple modifications, however, the machine can be made to handle larger work.

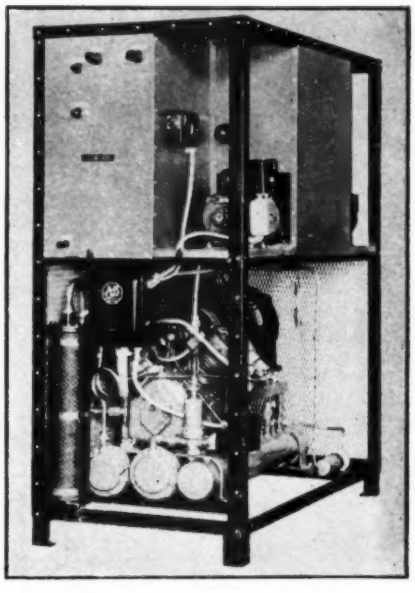
The work is suspended in slings and is adjusted into position by means of two davits, each of which is equipped with a chain hoist. The davits, work supports and centering heads are adjustable along the base for proper setting for the job. A vertical line is scribed across each end while the work is suspended in the slings by means of a square resting on a surface plate and located against a centering gage above the sling. The work is then slightly rotated in the slings by a chain wrench and another vertical line is scribed across the ends. The intersection of these lines indicates the center of gravity. The work is then lowered into the V-blocks of the two supports.

To properly position the center scribed on the end with the centering tool the work supports have both horizontal and vertical adjustment. Horizontal adjustment is by means of a screw and handwheel, and the vertical adjustment is by a self-contained, hand operated hydraulic jack. The work is clamped in position after it has been located in each work support.

Two spindles are provided with each of the centering heads, one for a starting tool and the other for final centering operation. Both tools are driven by a standard foot-mounted motor which is mounted in the base of the head and driven through a V-belt and gear drive. Each head has a separate motor driven coolant pump and individual pushbutton control for the spindle drive. Coolant tanks are formed integrally in each end of the welded base construction.

The first tool on each head is fed into the work and withdrawn by the star handwheels. The heads are then moved laterally by means of a hand lever and properly indexed by a spacing arrangement into position for the second tool. The final centering tools are fed into the work in the same way as the first tools.





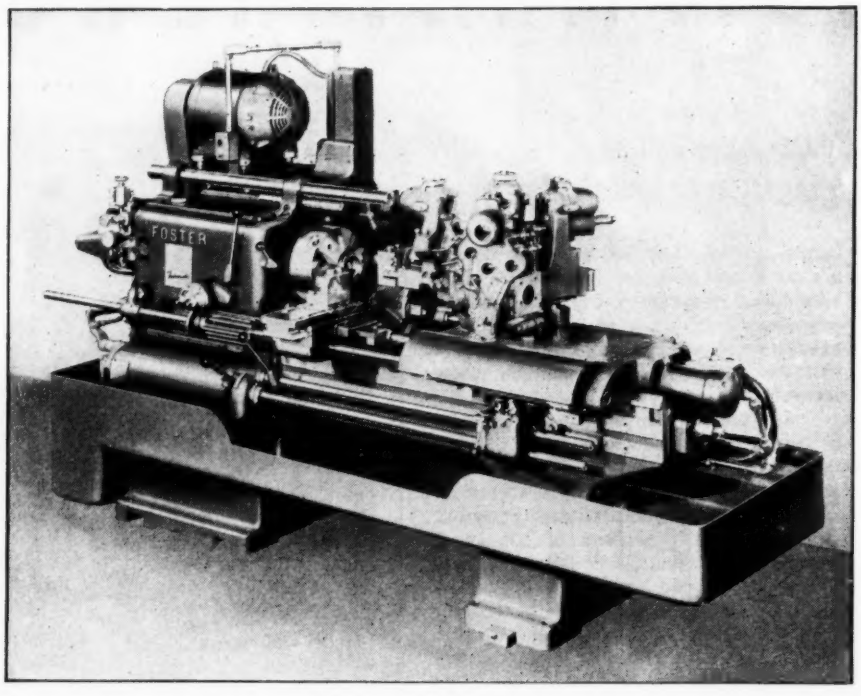
F-M Spot-Welding Tip Cooler Is Built Into a Compact Unit

A spot-welding tip cooler announced by Fairbanks-Morse & Co., 600 South Michigan Ave., Chicago, Ill., is a self-contained unit which circulates a special non-corrosive, non-precipitating solution through welding tips of a spot welder. It is equipped with two pumps driven by motors having cycling overload relays. A built-in-one group recirculating pump, operating continuously with the compressor, circulates the refrigerant through the evaporator for high heat transfer. A turbine type pump controlled by manual switch circulates the special solution of high specific heat characteristics from the unit to the welding tips and back to the unit.

The compressor is equipped with force-feed lubrication system, and is of four-cylinder V-type short stroke, single-acting, reciprocating design. The crankcase is provided with bull's-eye type oil level sight glass. The cooling capacity is 8,400 B.t.u. per hr. with —25 F. refrigerant suction temperature and 75 F. water to the condenser. The shaft seal of the bellows is self-sealing balanced pressure type.

The motor is 3 hp., 3 phase, 220-440 volt, 60 cycle. This cooler is built into a compact cabinet, providing for and including proper insulation of the cooling or evaporator unit. The refrigerating machine is mounted in the base of the cabinet. The entire assembly is designed to maintain —5 F. tip fluid temperature as optimium condition. Floor space occupied by the tip cooler is 25×44 in. and height is 55 in.

Foster Lathes With Independent Turret Face Feeds Built to Perform Multiple Cutting Operations



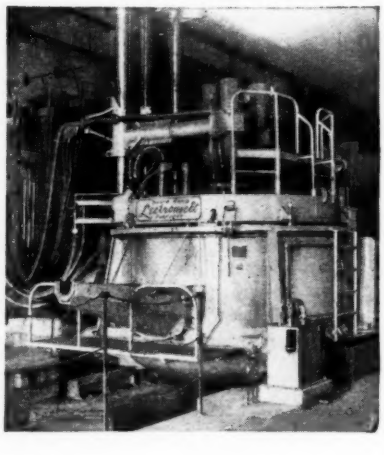
International Machine Tool Corp., Foster Div., Elkhart, Ind., has announced the No. 1-F and No. 2-F Foster Fastermatic turret lathes with completely automatic machining cycle. A flexible hydraulic feed system provides an independent feed for each face of the turret. This unit is built into the machine and the pump which operates the controls is mounted inside the bed between the headstock and driven by a double solid roller chain from the main drive shaft. Multiple cutting and various combinations of machine movements may be readily performed on these Fastermatics. The 1-F lathe has a range of 27 spindle speeds from 22 to 332 r.p.m. arranged in nine sets of three automatic changes, while the 2-F machine has a range of 28 spindle speeds from 17 to 263 r.p.m. arranged in seven sets of four automatic changes. Speed changes are made automatically and may be changed at any time while the machine is in operation, during the cut or at the end of the turret stroke.

The 1-F Fastermatic is furnished with a 7½ or 10 hp. motor and the 2-F is supplied with 10 or 15 hp. motor. The motors are standard 1,800 r.p.m. and maintain a speed of the drive shaft of 1,040 r.p.m. Start and stop pushbuttons, controls and wiring are of the built-in type. An automatic safety control is provided to open the circuit on the main drive motor if the operator should leave the machine in either forward or reverse quick traverse position.

A multiple disk clutch acts as a spindle brake when the spindle control lever is shifted to the left. Facing, cut-off or forming operations are simultaneously performed with the hexagon turret provided with two slides, one at the front and the other at the rear. Standard or special toolblocks may be mounted at any desired position on the slides to accommodate the work at hand. Constant headstock temperature for precision spindle alignment with the turret hole centers is maintained by a thermostatically controlled heating system. The headstock is automatically lubricated by a splash system and oil pump. The cross-slide ways and turret slide ways are lubricated from oil reservoirs cast in the member. Brass plate coverings prevent the entrance of chips and dirt.

Pittsburgh 10-Ton Furnace Has Increased Scrap Capacity

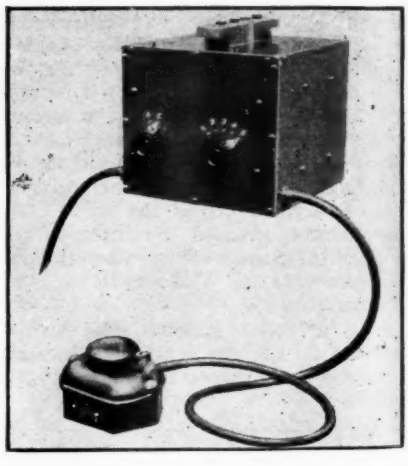
Improvements in the design of the 10-ton furnace for handling light scrap has been announced by the Pittsburgh Lectromelt Furnace Corp., 152 32 St., Pittsburgh, Pa. The side walls have been deepened to allow a greater increase in scrap capacity than formerly accommodated. Including the linings, the walls are 13½ in. thick. The furance is cylindrical in shape with spheroidal bottom.



Berwick Heater Transformer Has Foot Treadle Control

A small Berwick electric metal heater transformer has been announced by American Car and Foundry Co., 30 Church St., New York, N. Y. This 10 in. transformer has ten heat speeds and a foot treadle for putting on and cutting off the current. It is built for heating condenser assemblies.

The heater has 60 cycle low voltage and is constructed in the same way as the screen heating transformer except that it is equipped with induction coils suitable for heating nitralloy bushings 3⅞ in. outside diameter, with a ¼ in. wall, 3⅝ in. long to 400 to 500 deg. in 1 min. and 15 sec. with a 25 kva. demand.



Rated at 150 kva. the same transformer is used for heating axles, and a similar transformer can be used for induction heating of a steel crankshaft in which frozen bushings are inserted.

Globe Portable Hydraulic Lift Has 21,000 Lb. Lift Capacity

Suited for assembly work in aircraft plants, as well as inspection and maintenance operations in airports, Globe Hoist Co., 1000 East Mermaid Lane, Philadelphia, Pa., has introduced the Type A-70 portable electric hydraulic lift. The total lifting height of the unit is 111⅜ in. The top of the plunger is equipped with a half-ball socket, and the extended height of the power plunger may be locked in any of various heights by inserting a steel safety bar through holes spaced 3 in. apart along the length. The screw jack part of the plunger may also be locked at any height.

The lifting mechanism is mounted on a baseplate which is suspended independently from the chassis by three

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Who have some mechanical ability.
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WAR WORK

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Women Welcomed!

No, the young woman at the lathe is not a "glamour-girl," especially selected because she is photogenic. She's an honest-to-goodness worker on a Monarch lathe, doing war production work. She never saw the inside of a machine shop before she was hired, but in a few weeks she was turning out a good day's work of precision parts, accurately and on schedule.

Part of her success, and that of the thousands of women now in war work, lies in careful selection, adequate training and helpful supervision. Part of it also—at least for those women who work on Monarch lathes—is due to the ease of operation, the precautions taken to lessen fatigue, and the accuracy and dependability built into Monarchs.

For the vast majority of turning work done on Monarchs, you can welcome women at your employment office and in your plant. The substitution of "woman-hours" for man-hours will effectively help give you more machine-hours. If you'd like some firsthand information on the subject, send for the booklet "Women in Production Work." It's yours for the asking.

THE MONARCH MACHINE TOOL COMPANY
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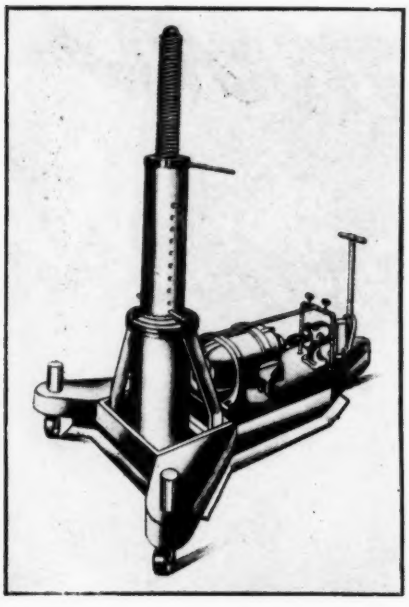
MONARCH LATHES *Cover the Turning Field*



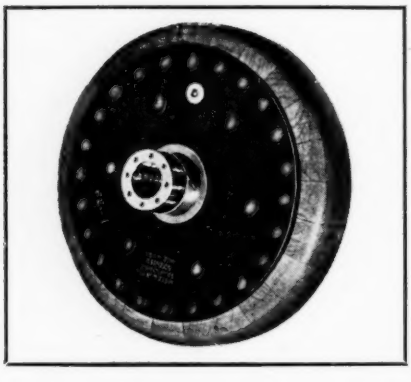
completely housed coil springs. When not under load this baseplate is held up 2 in. from the floor and the lift may be moved about on large, anti-friction type wheels. Under load the baseplate is forced downward to engage the floor.

Operation of the power cylinder is by means of a 5 hp., 220 volt, 3 phase, 60 cycle, explosion-proof motor, direct connected to a 15 gal. per min. geared pump. Oil displacement of the power cylinder is 7 gal.

Maximum lifting capacity is 21,000 lb., and the sustaining load capacity is 63,000 lb.

Metzgar Improved Trailer Wheel Is Made of Selected Hardwood

Improvements in the heavy-duty wheel for trailer use made by Metzgar Co., Grand Rapids, Mich., include a more scientific arrangement in the number of wedges, employing the use of 5/16



in. rivets. The wheels are made in a range of sizes from 2½ to 20 in. in dia., fitted with either oilless End-Wood or anti-friction bearings, with faces up to and including 5 in. These wheels are made of selected hardwood and the butt ends of the wedges form the tread. A more scientific arrangement of the wedges is an added improvement.

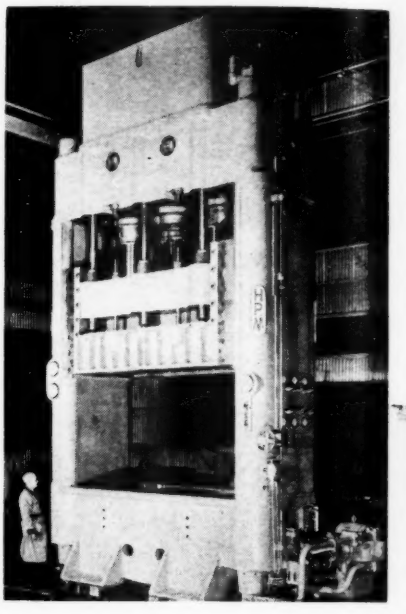
Hydraulic Fastraverse Sheet Metal Deep Drawing Press Can Be Employed Also for Single Action Press Work

A self-contained H-P-M Fastraverse deep drawing press for sheet metal has been brought out by Hydraulic Press Manufacturing Co., Mount Gilead, Ohio. It will accommodate all standard types of deep drawing dies, or can be employed for single action press work such as coining, sizing, straightening. The press is equipped with a blank holder and die cushion for drawing large, deep metal airplane parts. A matched punch and die set is used with this type of press. A ring carried by the blank holder slide holds the blank while the part is drawn. The part is usually completely drawn from a flat blank to the required shape in a single press stroke.

The blank holder slide is in tandem with the main slide and suspended from it. The two slides advance together at identical speed until the blank is contacted. Blank holder pressure is variable at six points on the periphery of the blank holder ring. Pressure resistance of each of the rams can be adjusted individually and independently. Pressing surface of the blank holder slide is 120×60 in.

The hollow press bed is fitted with a hydraulic die cushion which can also be used as an ejector. Maximum daylight opening of main slide to the bed is 114 in.

Only one hydraulic pump is required for operation. Oil trapped in the blank holder and die cushion cylinders is intensified by the downward acting

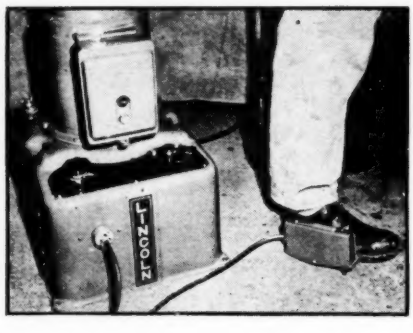


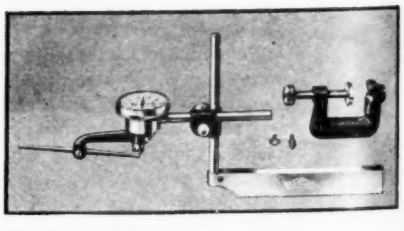
movement of the upper punch carrying slide. The closed circuit system, which employs no operating valve for press reversal, is used in this press. Instead of a valve the output of the variable-delivery radial pump is reversed.

Operation of the deep drawing press is manual, semi-automatic or full automatic. It has 750-ton maximum pressure capacity. The machine weighs 231,000 lb.

Lincontrol Welding Control Straps Onto Operator's Foot

To speed up welding work, Lincoln Electric Co., 12818 Coit Road, Cleveland, Ohio, has introduced the Lincontrol which is strapped onto the welder's foot and enables him to move about with it freely. It is applicable for welding of light gage sheet metal of all kinds. The operator presses down on the pedal which moves the pin to operate a current control. As pressure is exerted, the current is increased. This permits accurate control over the welding arc, and allows the operator to adjust the arc at any time without changing his position. This control eliminates the necessity of making adjustments on the welding machine. The unit can be plugged into a socket on the machine. It is designed for the Lincoln Shield-Arc Junior welders, and can be adapted for the control by obtaining a new voltage rheostat for the machine.





Ames No. 22A Test Indicator Includes a Hole Attachment

A universal test indicator No. 22A has been announced by B. C. Ames Co., Waltham, Mass. It is suited for use on conventional testing jobs, and with hole attachment can reach internal surfaces and places difficult to get at. The set includes a No. 101H indicator, indicator holding rod, three contact points of different lengths, hole attachment, toolpost holder, sliding swivel and C clamp and an upright spindle. The hole attachment fits a 0.375 in. diameter indicator stem.

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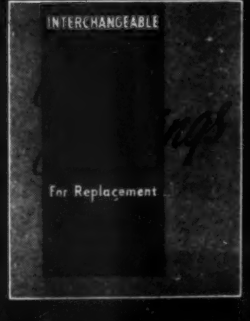

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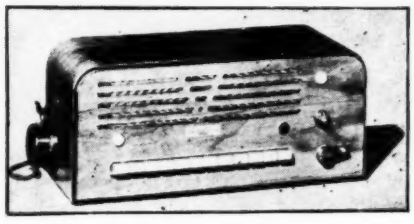
NEW DEPARTURE BALL BEARINGS

3113

Talk-A-Phone Communication System Has Conference Control

The Super-Chief model inter-communication system introduced by Talk-A-Phone Manufacturing Co., 1207½ West Van Buren St., Chicago, Ill., features conference traffic control. This enables any number of stations to hold a private conference without interruption or eavesdropping from other stations outside of the conference group. When one of the group is being called, he is signalled by a light. A busy signal light works in conjunction with the traffic control, and is illuminated when the line on the station called is busy, remaining lighted until that station is ready for a new conversation.



This inter-communication system includes Uni-Trans. one way automatic transmission, which is useful for the dictation of letters and complete recording of conferences. Finger-tip pushbutton control operates the unit. An amplifier delivers an output of 5 watts and permits operation with undiminished power with units as far as 3,000 ft. from one another.

A-C Electric Furnace Control Has Regulex Energy Exciter

Announcement of an electric arc furnace control has been made by Allis-Chalmers Mfg. Co., Milwaukee, Wis. The Regulex exciter which has been applied to the furnace electrode control is designed to control arc energy to a constant quantity without the use of contact making devices. Part of the control element used in this method includes control field windings that measure arc current and volts. The small generator which supplies power to the electrode motor causes the motor to raise or lower the electrode as required. The variable voltage control eliminates high voltage inrushes and is said to reduce production delays.

Snyder Horizontal Machine Drills and Reams Plane Parts

A single-end horizontal machine for drilling and reaming aircraft parts has been developed by Snyder Tool Engineering Co., 3400 East Lafayette St., Detroit, Mich. Two fixtures are used in the operation. One is used for drilling the side walls of the fork-like flange. Equalizing clamps are used to balance the stock to bring the drill hole in the exact center of the boss. Guide bushings are provided in front of each side member. After being drilled this flange is welded to a tubular member, and the outside diameter of the tubular member is used for locating the assembly in the second fixture. This fixture is equipped with a pivoted two-hole bushing plate, one set of bushings for core drilling the holes and the other set for line reaming. A quick-change tool chuck permits fast exchanging of drill, core drill and reamer.

So that the various tools can be driven at their proper surface speed a quick speed change is provided for the spindle. By use of pick-off gears the over-all spindle speed may be changed.

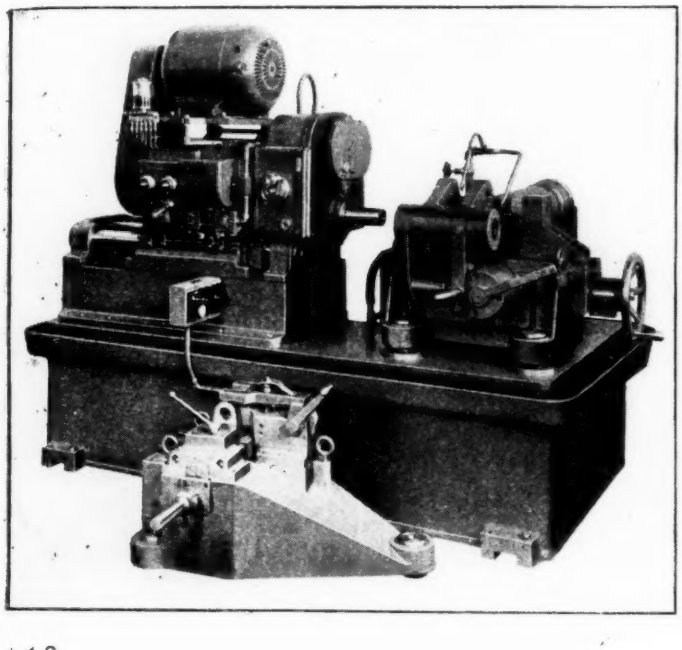
The head and drive unit are mounted in hardened, ground guide bars. The base of the machine contains the coolant tank and is welded steel construction.

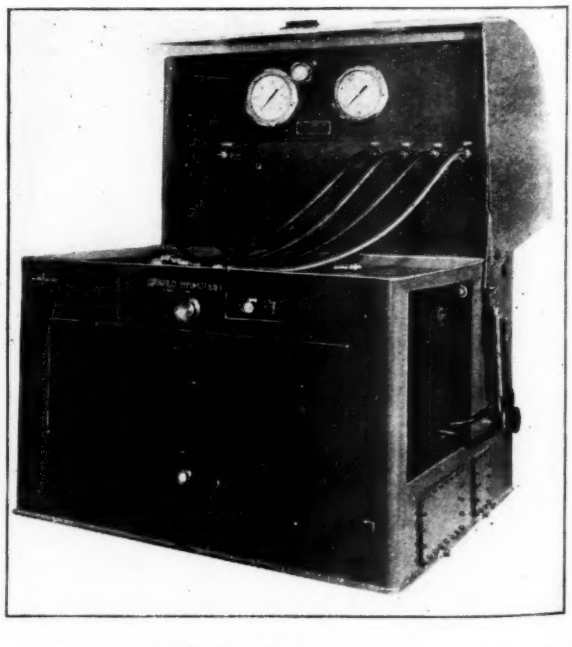
Graf Hydrostatic Tester Has Several Safety Factors

Several safety factors that prevent injury to the operator are incorporated in the Grafco hydrostatic testing machine built for ordnance work by the V. L. Graf Company, 8825 Grinnell Ave., Detroit, Mich. The object of this machine is to obtain a speedy, accurate check of castings or other components for soundness, porosity or adequate bursting strength.

Inherent safety in operation, freedom from explosions of the part, or hydraulic fluid spraying about the workplace, are secured from two main design features. First, the air is exhausted from the part by a built-in vacuum pump, and water or other fluid used for testing is introduced into the work cavity, filling it completely before the pressure is imposed. Thus false test readings from entrapped air are eliminated. Neither is there a possibility of explosion through diesel action, such as can occur when oil is used for the pressure fluid and air is trapped above it. Second, if the part should rupture, fragments and hydraulic fluid velocities are minimized by no further delivery of fluid, and the operator is protected by a steel hood which must be swung down into place before the test can be made, thus preventing possibility of injury.

Pressure is applied indirectly to the testing water by means of intensifiers, in which hydraulic oil and water are separated by a special lantern gland, which prevents intermixing of the two fluids, this method providing a true static non-pulsating pressure on the part. However, pressure variations within the range of each intensifier may be made instantly by a manual





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THERE ARE SEVERAL GOOD REASONS WHY AND AND MANUFACTURERS ARE USING "MICHIGAN" GEAR FINISHING MACHINES SO EXTENSIVELY. THEY CAN TELL YOU A LOT ABOUT THE VASTLY INCREASED OUTPUT AND THE GREATER ACCURACY OBTAINED WITH THESE MACHINES, EMBODYING THE

PRINCIPLE.

IMPORTANT HOWEVER, ALSO, IS THE FACT THAT THERE IS A "MICHIGAN" TO SUIT EVERY PURPOSE. THERE IS A LIGHT DUTY 861-4B WHICH WILL HANDLE GEARS FROM

DOWN TO

. THERE ARE 12 TYPES OF 860'S FOR 'S FROM INCH TO 18 INCHES INCLUDING GEARS.

FOR MAXIMUM PRODUCTION AND LOWEST TOOL , THERE IS THE 900 SERIES RACK TYPE MACHINE. THEN YOU HAVE THE 862'S WHICH WILL FINISH GEARS UP TO TWO FEET AND THE VARIOUS MODEL 865'S WHICH RANGE IN CAPACITY AS HIGH AS 16 FT.

THERE IS A BULLETIN ON EVERY STANDARD MACHINE TYPE. WRITE TODAY ON YOUR COMPANY LETTERHEAD.

MICHIGAN TOOL COMPANY

7171 E. McNICHOLS ROAD • DETROIT, U. S. A.

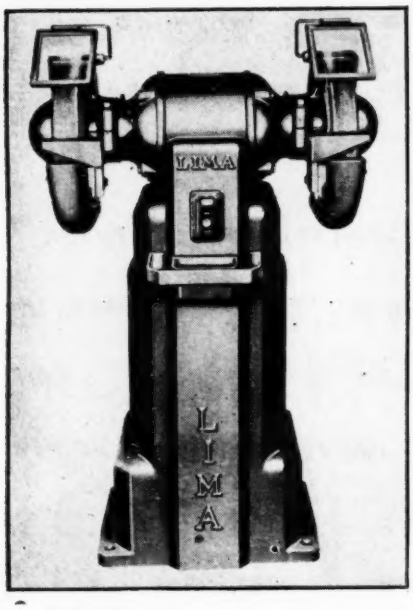
control conveniently located on the front of the machine.

Accidentally subjecting a part to unwarranted pressures is prevented by four separate flexible connections which in turn have adapters to suit desired fixtures. The range of each connection is: No. 1—0 to 1,000 lb. per sq.in.; No. 2—1,000 to 3,000; No. 3—3,000 to 6,500; and No. 4—6,500 to 15,000.

The part is clamped in the fixture and the hood closed. This action lights the interior of the hood and simultaneously energizes a relay which is interlocked with a pushbutton start. The closing of the pushbutton starts the automatic cycle of the machine. The part is filled rapidly with fluid by evacuating the air. A float switch in turn stops the vacuum pump and starts the hydraulic pump, and pressure responds immediately. When the necessary observations have been made, a reversing lever is depressed, the machine resets and stops automatically, returning the testing fluid to the tank without waste. Fixtures with quick disconnects may be provided, and from 10 to 40 parts may be tested per hour, depending on size.

Lima 2 and 3 Hp. Grinders Are Made for Toolroom Use

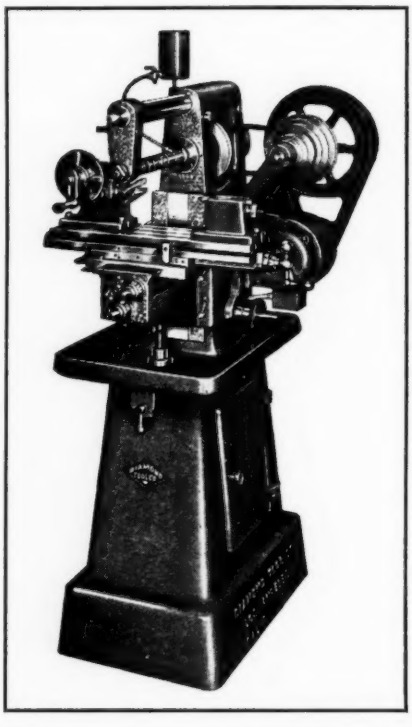
A toolroom pedestal grinder has been brought out by Lima Electric Motor Co., Lima, Ohio, which has an adjustable toolrest, improved safety wheel guards, combination lift-out water pot and tool tray, and wheel guards equipped



with exhaust vents. The grinder has pushbutton motor control with overload protection. The wheel arbor diameter is 1¼ in., and height to the arbor is 39 in. Size of the 24S type is 29½ in. in width over-all, and 35⅝ in. for the 25S type. Capacities of these types are 2 and 3 hp., respectively. The machine is suited for 2- and 3-phase a.c. only, 220, 440 or 550 volts.

Diamond Offers Milling Machine In Toolroom, Production Models

A milling machine available in both toolroom and production models has been announced by Diamond Tool Co., 3429 East Olympic Blvd., Los Angeles, Calif. This small machine has a precision high-speed needle bearing overarm arbor support bearing, vertical collapsible pulley arrangement with safety device and motor lock for speed changes. It is equipped with the minimum number of manual lubrication

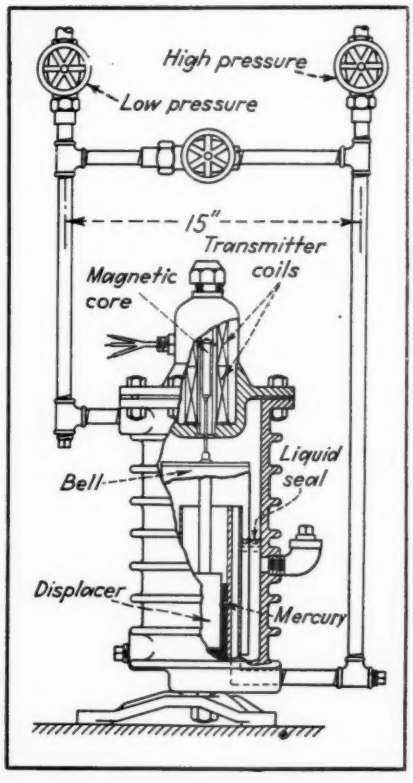


fittings and a one-shot spider-web lubricating arrangement for the table, saddle and knee. The production model has a rack and pinion feed for speeding up output.

Cochrane Style H Transmitter Measure Low Pressure Gases

For use in conjunction with standard Cochrane electric meter receiving units Cochrane Corp., 17 and Allegheny Aves., Philadelphia, Pa., has introduced the Style H transmitter. It is designed for the measurement of low static pressure gases.

Differential pressure created by flow is applied to the opposite sides of the oil-sealed bell with the pressure from the connection before the primary element being applied under the bell and the downstream pressure above the bell. When no differential pressure is exerted, a metallic displacer in the central reservoir is submerged in mercury to a point where the bell and displacer just float. A flow of gas raises the bell, lifting the displacer from the mercury with the change in buoyancy sufficient to give a bell movement proportional to the differential pressure.



Pressure in excess of the design differential will move the bell to its upper limit and the gas will bubble out from under the bell with small disturbance. Normal operation of the meter is resumed when the differential falls to normal values.

The sealing oil level can be quickly checked through the filling plug without removal of the top cover. The same mounting bracket can be used in either wall or floor mounting of this unit. The Style H transmitter is designed for differentials of 2, 4, 6, 8 or 10 in. of water. Maximum working pressure of the bell casing is 75 lb. per sq. in.

Wales CD Hole Punching Units Are Independently Mounted

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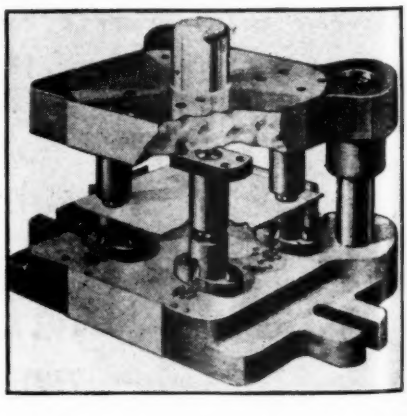

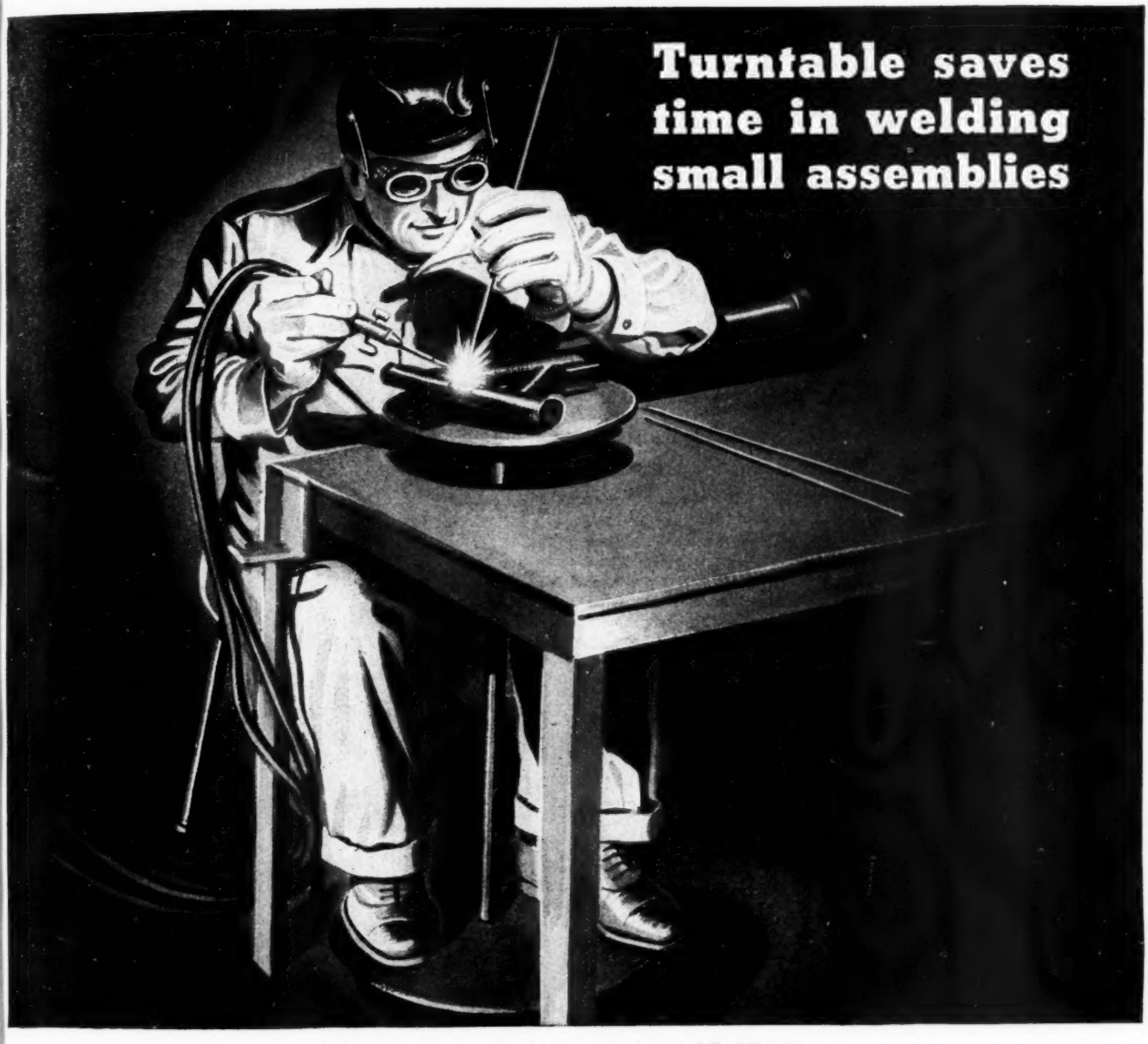

Information supplied by an Industrial Publication

Several means are being applied industrially to save time and reduce fatigue of welders working on heavy jobs. Positioning tables, rotating jigs and similar devices for handling heavy or bulky assemblies are quite generally used.

One aircraft manufacturer has adopted a similar idea for welders working on small sub-assemblies. The assemblies are light, and joints are usually quite accessible. But moving the assemblies by hand does occasion some delay.

This is obviated by mounting the work on a small turn table somewhat resembling an old style potter's wheel. The turn table is quite simple, consisting of two round plates mounted on a common shaft.

The upper plate carries the work, and is located at a convenient height above a work table. The lower plate is a few inches above the shop floor. It is positioned so that the operator's feet rest on it comfortably.

Thus, when the operator wishes to move the work, he simply "indexes" the lower table by foot power. The weight of his feet on the plate is, however, sufficient to hold the whole turn table steady while he is welding any particular joint.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE BRIQUETTES • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

MOLY

Climax Molybdenum Company
500 Fifth Avenue • New York City

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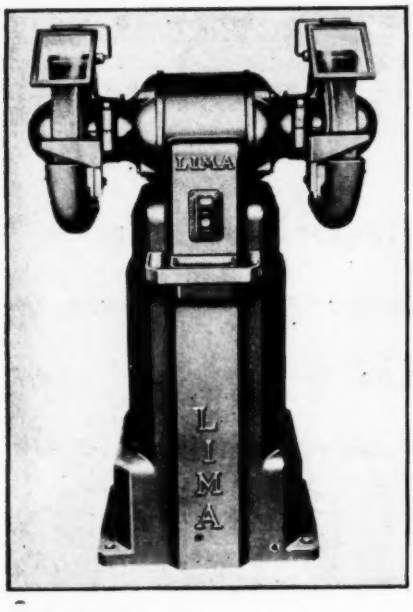

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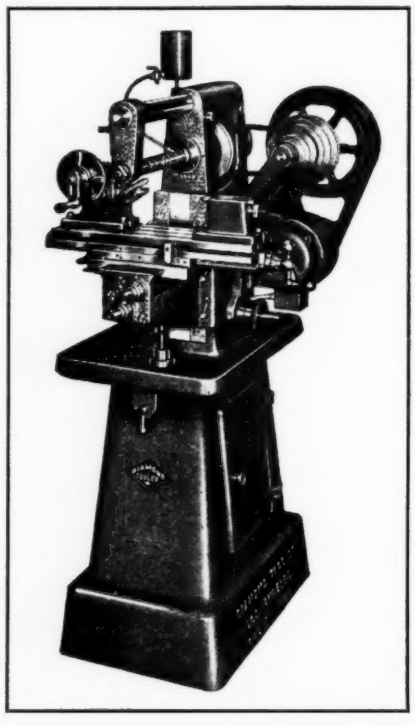

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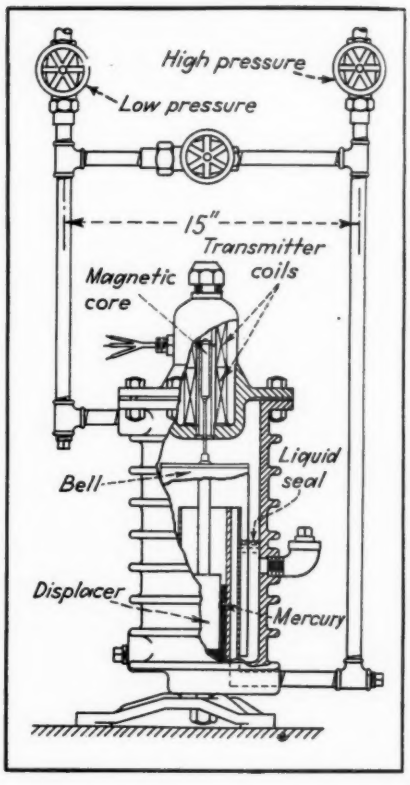

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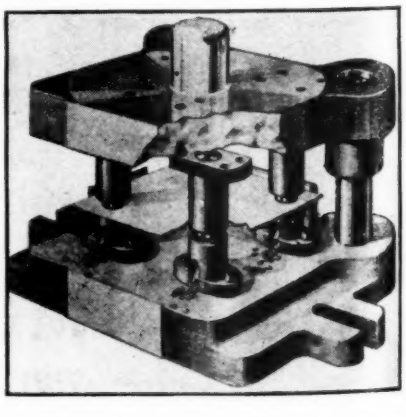

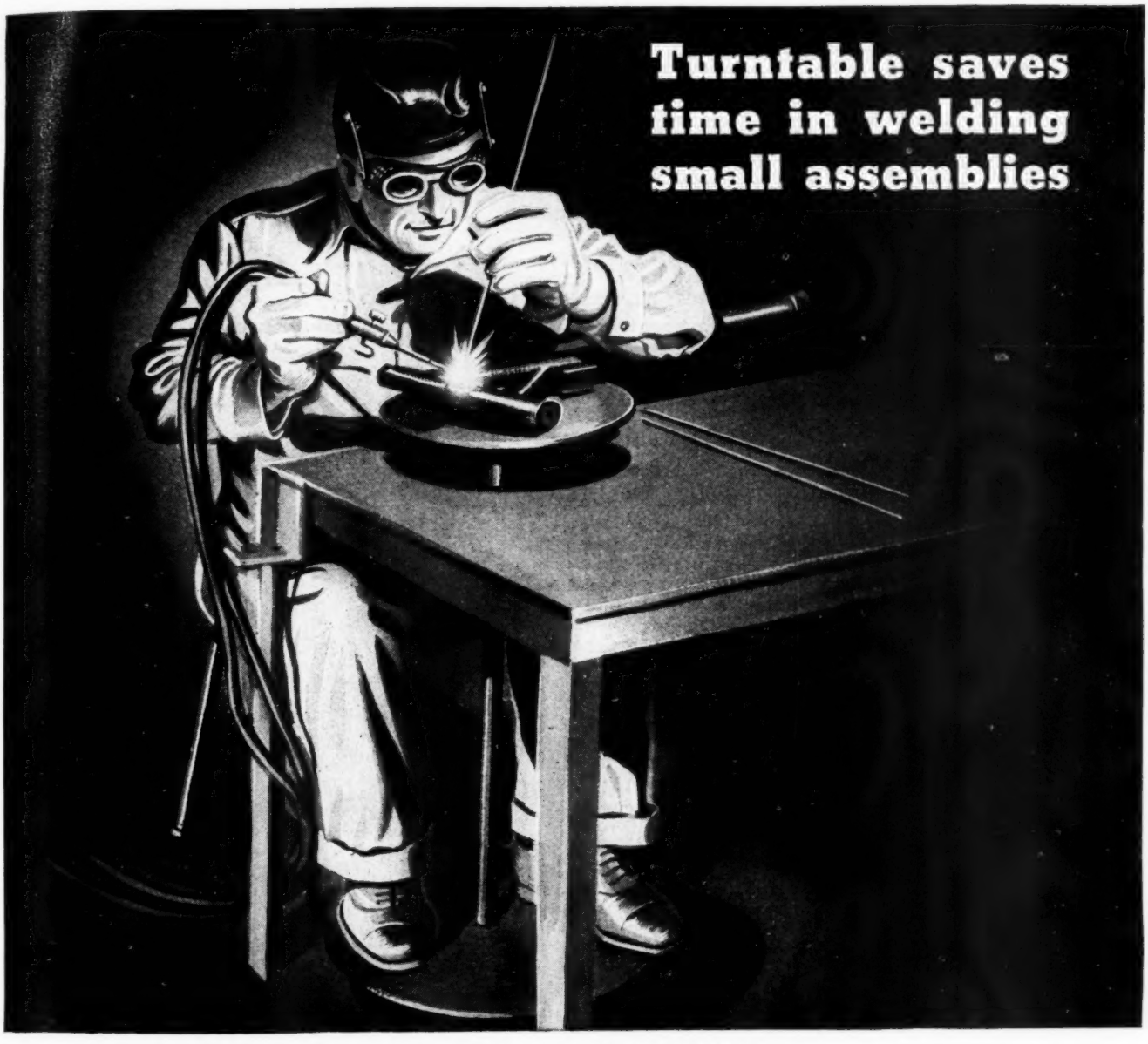

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Climax Mo-ly-b-den-um Company
500 Fifth Avenue • New York City

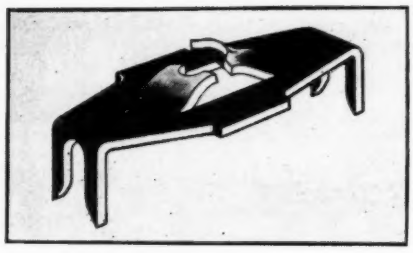
MOLY

and a guide while the die unit half consists of a holder with a slug clearance chute and a die. Each CD unit is self-contained and independently mounted to either punch or die shoe, enabling the quick changing of individual punches and dies to replace parts without breaking down the entire die set.

To assure punch and die alignment automatically a pilot pin centered on the punch or die has been built in each holder and die-holder. These CD units are used in either press brakes or punch presses to punch holes from 1/16 to 1⅛ in. diameter in metal up to No. 11 gage.

Tinnerman Produces Speed Nut For Assembling Plywood Parts

A speed nut for plywood which is self-locking and which can be instantly driven into anchored position has been introduced by Tinnerman Products, Inc., 2102 Fulton Road, Cleveland, Ohio. It has two pair of integrally formed attaching legs. When the nut is driven into thick plywood, the cam-like structure of the legs forces them outward, permanently holding the speed nut into the wood. The legs peen over



when driven against a backing plate in thin plywood sections. The nut is extremely light in weight and has been found useful in assembling plane parts made of plywood and other aircraft equipment. It has been made for use on standard metal screws.

Westinghouse Electric Watchman Measures Vibration in Shafts

An automatic electric watchman which is no larger than a good-sized box camera has been brought out by Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., for measuring in thousandths of an inch vibrations in the spinning shafts of turbo-generators. A warning is jotted down in red ink when the instrument detects vibrations. The line normally stays at a steady level registering normal balance, but when a deviation in the line occurs the operator knows that a minor adjustment is needed to eliminate the unbalance and vibration and avoid a possible breakdown of the turbo-generators.

The detector consists of a babbitt-tipped rod that touches a revolving shaft, a miniature generator which creates about one millionth of a watt of electricity, an amplifier to step up the current and a recorder which pens a vibration curve.

Selas Magnesium Furnace Holds 2,000 Lb. of Metal

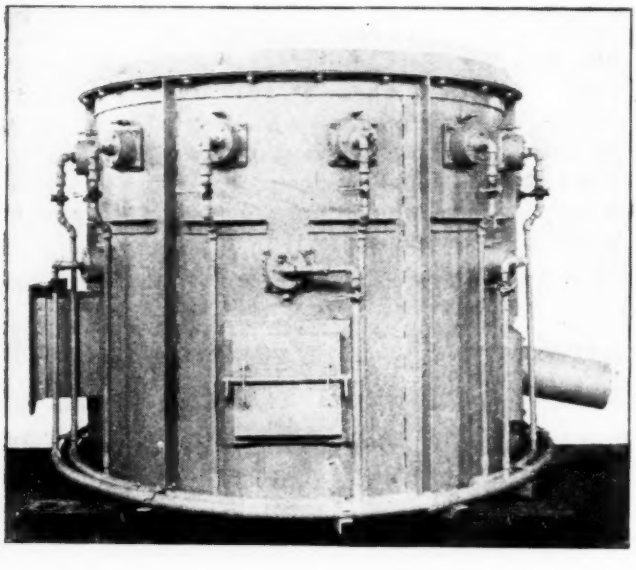
A magnesium melting furnace announced by the Selas Co., Erie Ave. and D St., Philadelphia, Pa., adapts the ceramic-cup radiant gas burner to give uniformity of heat delivery over the sides and bottom of the pot. One large unit illustrated holds 2,000 lb. of metal in a pot which is 3 ft. in both diameter and depth.

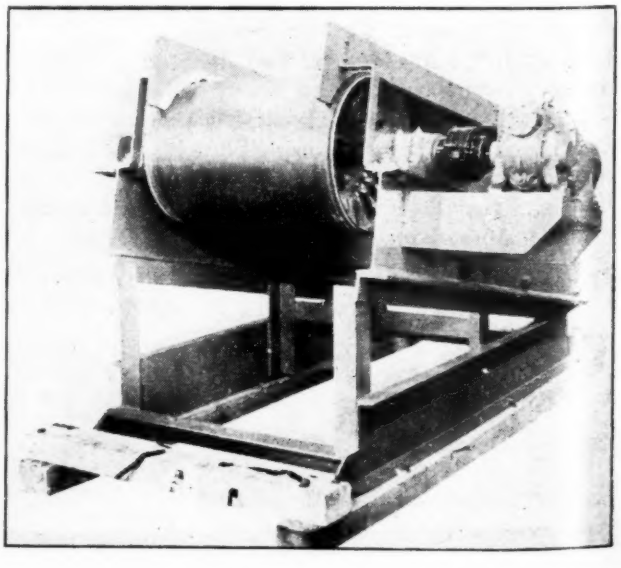
Around the circular pot setting 18 ceramic-cup radiant gas burners are employed, 12 in the top row and 6 in the bottom row. Gas and air premixed in correct ratio are delivered at 12 to 15 in. water column manifold pressure to each burner through an individual line and manual valve. A single valve two-point control actuated by a thermocouple in the molten metal operates to throttle or open the manifolded mixture supply to all the burners at once, and automatically maintain a pouring temperature of 1,350 F. in the pot at all times. An auxiliary thermocouple is provided so that a maximum outside pot temperature determined by the user cannot be exceeded.

Among the design features of this furnace are split manifolding, two large opposed clean-out doors, an emergency run-out spout with 3-in. opening, bottom venting, 2-in. fire extinguisher openings around the pot rim and hard-burned refractory facing on the furnace floor and part way up the walls to resist molten magnesium in case of pot leakage.

Dings Magnetic Separator Has Coils Covered With Bronze

A high intensity magnetic pulley type separator for the reclamation of steel and iron has been developed by Dings Magnetic Separator Co., 509 East Smith St., Milwaukee, Wis. The machine incorporates a high intensity magnetic pulley of serrated air-cooled construction. Four pole pieces extend completely around the circumference of the pulley and the magnet coils are wound between these pole pieces. Heavy bronze coil covers protect the coil. The bronze prevents short-circuiting between the poles because of its non-magnetic properties, thus allowing the magnetic lines of force to extend a greater distance away from the face





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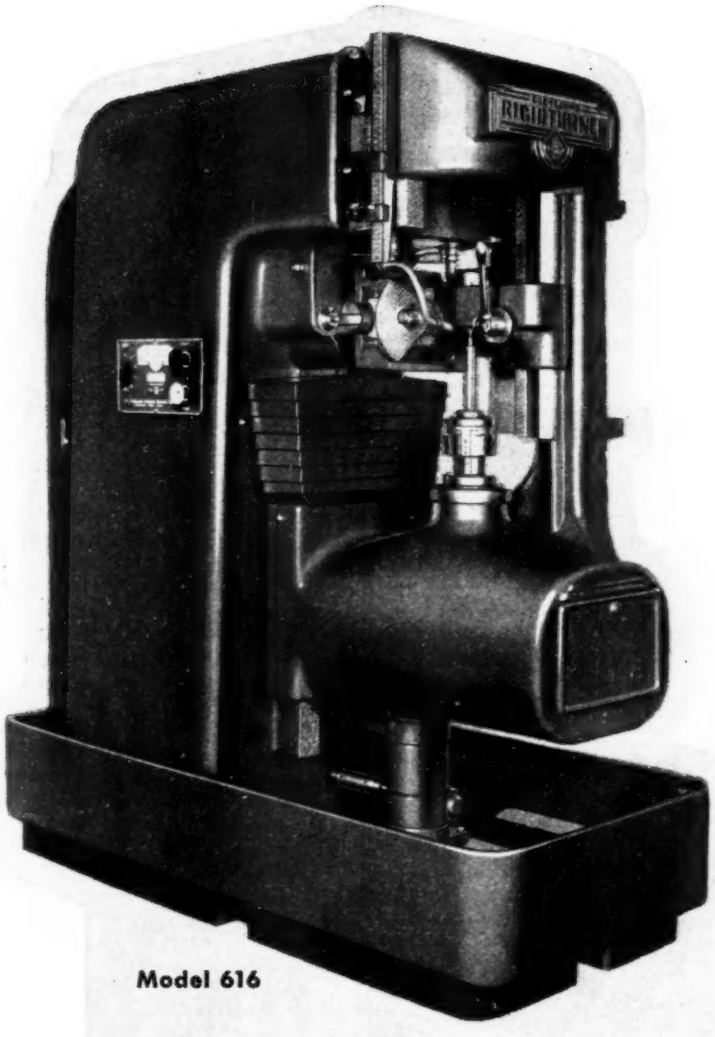
• FAITHFUL DUPLICATION •
• GREATER PRODUCTION •

The RIGIDTURNER
method of turning multiple diameters



Model 616

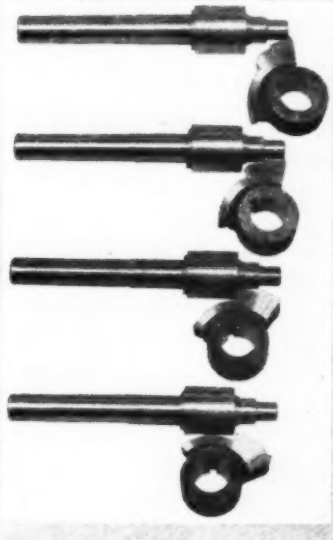
• Check these Rigidturner advantages on your present and future multiple diameter turning jobs—

More operating minutes per hour
Less down time
Quick change over
More pieces per hour
Absolute duplication
Automatic or Manual operation
No skilled help required

The Rigidturner is also available in an 8 spindle rotary model for the mass production of precision duplicate work.

For complete details on the Rigidturner —what it is—how it works—how it can boost urgently needed war production—is fully explained in this bulletin. Write today for your copy.

Consult a CH Engineer on this modern, speedy, low cost method of turning multiple diameters.



*
HERE'S WHAT HAPPENS

A disc type form cutter is mounted on an arbor. The piece being turned revolves past the cutter, which in turn is rotated in timed relation to produce concentric or tapered diameters on the work. One pass finishes a cut. On abnormally long sections it is not necessary to keep the cutter in timed relation. In such cases, the circumference of the cutter is reduced which reduces the diameter.

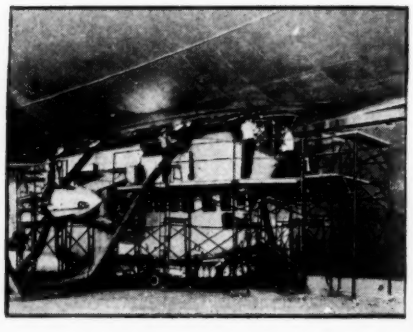
The CLEVELAND HOBBING
Cleveland ... MACHINE Company ... Ohio
BUILDERS OF RIGIDHOBBERS AND RIGIDTURNERS

of the magnetic pulley, increasing the capacity and intensity of the unit.

Lips are placed on either end of the frame so that the unit may be dragged by means of a tractor. A gear reducer unit is installed integrally with the machine and connected directly to the drive shaft of the pulley.

Safway Builds Scaffolding With Extension Facilities

Safway steel scaffolding, suited for both interior and exterior work in plants, has been announced by Safway Steel Products, Inc., 6228 West State St., Milwaukee, Wis. The basic unit consists of two end frames which are held rigidly together by two crossed braces

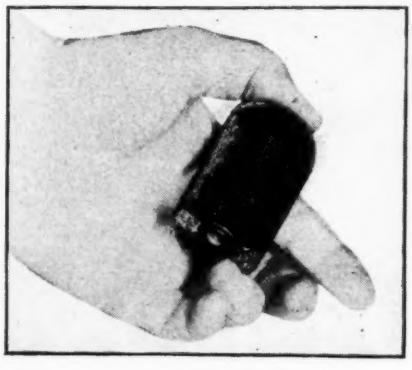


when erected. This forms a complete unit 5 ft. wide, 7 ft. long and 5 ft. high. By adding similar units through the use of coupling pins, any desired height is obtained. Additional lengths are made by adding frames and fastening them together with cross braces.

This scaffolding is light in weight, rigid and extra strong. All parts are interchangeable and may be used over again in many varieties of forms and shapes.

Osborn Rotary Wire Brush Removes Insulating Material

Announcement has been made by Osborn Manufacturing Co., 5401 Hamilton Ave., Cleveland, Ohio, of a rotary wire brush designed to remove insulating material from very fine wires in electrical instruments without marring the copper underneath. The brush is made of steel wire and has an extremely soft surface. It is in the form of a cylinder 1½ in. in diameter and 2 in. long. The insulation is taken off as rapidly as the operator inserts the wire between the rotating cylinders and pulls it out.

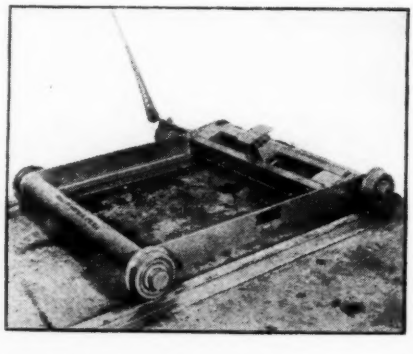


The brushes are mounted on spindles arranged so that they run parallel in order to clean entirely around the wire. Each brush may be mounted on a motor, or one may be used for both. The proximity of the brush surfaces is determined by the job to be done, and the rotary speed varies with the insulation and size of wire being stripped.

Savage Doall Gage Blocks Are Made in Three Grades

Designated as Set 400, the Savage Tool Co., Savage, Minn., has announced the Doall master gage blocks consisting of 81 blocks ranging in length from 0.050 to 4 in. These precision gage blocks are produced in three grades. The AA grade has accuracy of 0.000002 in., the A grade 0.000004 in., and B grade accu-

racy of 0.000008 in. The measuring surface of the block is lapped to a flatness of less than the quarter wave length of light and has a mirror finish. Practically any dimension in steps of 0.0001 from 0.1000 to 12 in. can be obtained by combination of the blocks.



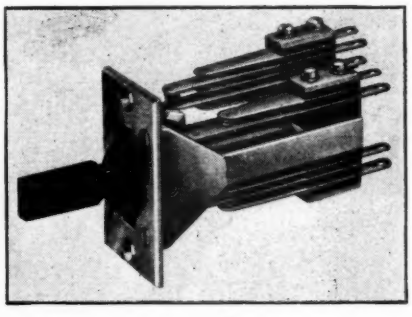
Whiting Four Wheel Dolly Features Elevating Mechanism

A four wheel dolly has been announced by Whiting Corp., Harvey, Ill., which is equipped with an elevating arrangement for removing a mounted pair of wheels and motor from diesel electric locomotives.

The elevating mechanism has an adjustable tilting plate and is operated by a ratchet wrench that may be located on either side. The plate is used for tilting the nose of the motor during wheeling or unwheeling operations.

Mossman No. 0-42 Lever Switch Features Spring Return Action

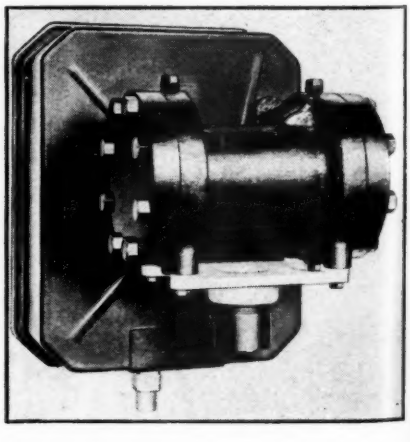
The No. 0-42 lever switch announced by Donald P. Mossman, Inc., 6133 North Northwest Highway, Chicago, Ill., is suited for use in aircraft, testing apparatus and a wide range of industrial applications. It is available in practically unlimited series of combinations of contact assemblies. This switch has positive action, locking, non-locking,



with spring return to neutral position and no throw stops. The handle is large and permits a firm grip by a gloved hand. The unit is furnished with or without the escutcheon plate. The cut-out dimensions with the plate are 1⅛×1 13/32 in., and for panel mounting the slot dimensions are 5/16×1⅛ in. The maximum recommended rating is 5 amp., 110 volt a.c.

Taylor Aneroid Manometer Eliminates Use of Mercury

Taylor Instrument Companies, Rochester, N. Y., has introduced an aneroid manometer which excludes the use of mercury or other liquid. Replacing the stuffing box is a torque tube assembly which gives a completely closed system and designed to eliminate friction and lubrication. Metal bellows respond to the pressure variations and react im-



CUT → MACHINING TIME
→ SET UP TIME

No. 3A DUOMATIC Performance Features

Fully automatic in operation—especially trained operator unnecessary.

Any combination of straight turning or angular "in" or "out" facing cycles, obtainable front or rear, simultaneously or independently.

Graduated tool slides can be swiveled to any angle, front or rear.

Independent mechanical feed and traverse mechanism—front or rear.

Front and rear cycles quickly changed over to suit the jobs—only simple mechanical adjustments required.

Controls duplicated front and rear.

Independent positive mechanical stops control diameters and lengths, front or rear.

Advantageous use of multiple tools—front and rear.

Write for Comprehensive Booklet No. 601-FL-742

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For **EFFICIENT PRODUCTION** *—in large or small lots!*

THE LODGE & SHIPLEY MACHINE TOOL CO.

CINCINNATI, OHIO, U.S.A

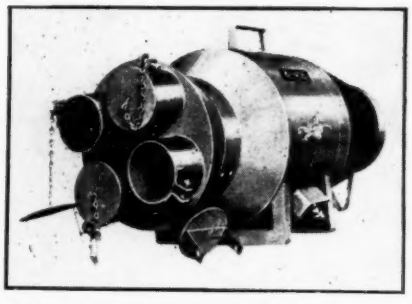
ENGINE LATHES — TOOL ROOM LATHES — AUTOMATIC LATHES

mediately to sudden changes in flow, and are built to withstand high overrange without damage.

The manometer is available for all types of recording and indicating meters and controllers, and is supplied for standard ranges between 20 and 500 in. of water. By substituting precalibrated torque tubes the range can be changed on the job.

Chelsea Junior Exhauster Eliminates Gases and Fumes

The "Octopus Jr." exhauster and blower, which is a small portable unit for eliminating gases and fumes from closed-in places, has been introduced by Chelsea Fan & Blower Co., Inc.,



1206 Grove St., Irvington, N. J. It is powered by a ¾ hp. ball bearing motor and blows or sucks 2,000 cu. ft. per min. The unit operates in any position. It is furnished with adapters for three 4 in. nozzles or four 3 in. nozzles for flexible hose and with caps to close the nozzles not in use. The unit can be lowered into a small manhole.

Stahmer Women's Safety Shoe Made With Water Tight Seams

A safety shoe for women workers has been announced by F. J. Stahmer Shoe Co., Davenport, Iowa. The soles are made from close grain maple cut with the proper rock for ease in walking

and for correct arch support. It has a 2-in. heel covered with a composition lift to eliminate noise.

All seams are water tight and the uppers are attached to the sole with wire and staple stitching. The uppers are made of pliable tan leather. Sizes range from 5 to 10. It is a blucher type oxford built over a combination last.

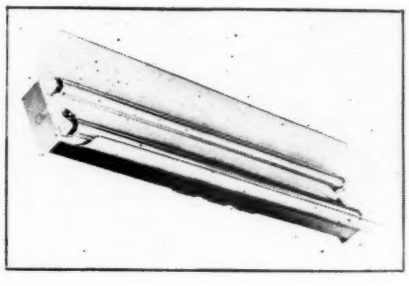
Matthews Steel Type Holder Serves Hand or Press Use

An interchangeable steel type holder suitable for hand or press stamping applications has been announced by Jas. H. Matthews & Co., Pittsburgh, Pa. For hand stamping use the removable head is placed over the shank and held in place by means of a setscrew. For press stamping use the head is removed and shank placed into the equipment.

For light duty marking character size up to ½ in. is recommended, and for medium duty marking character size up to ⅝ in. is suitable. Size up to ¾ in. is recommended for medium heavy duty which includes deep marking of carbon steel or high alloy tool steel. A slight pressure on a spring disengages the clip from the type groove for changing the type. It is available in letters, figures, symbols or logotype.

Spero Fluorescent Fixture Gives Full Light Instantly

Insta-Lite fluorescent lighting fixture has been announced by Spero Electric Corp., 18220 Lanken Ave., Cleveland, Ohio, to provide illumination to full intensity without flicker or delay when the switch is turned on. Ballast and starting switch functions are combined in this unit. Lighting is instantaneous and starts at lower voltages and temperatures. The unit is made for two 40 watt tubes for 110 to 125 volt alternating current.

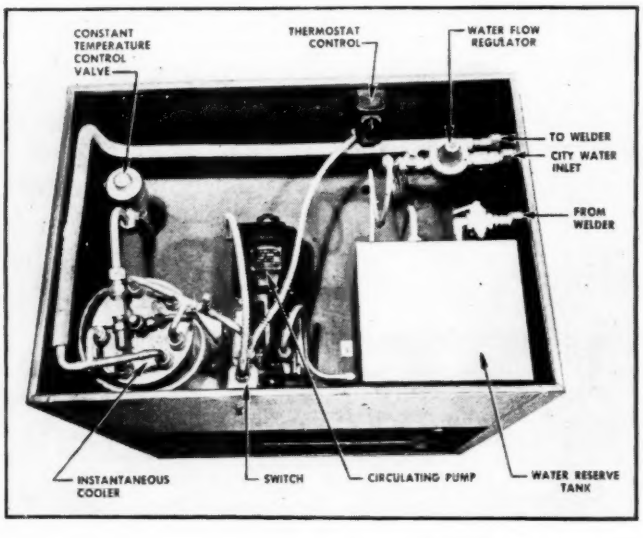


Temprite Spot Welder Unit Cools the Tips With Water

The Model 580-WC spot welder cooler announced by Temprite Products Corp., 47 Piquette Ave., Detroit, Mich., has been designed to supply a constant flow of low temperature water to electric spot welder tips and transformers. The unit operates as a water circulating system and can be used to operate one, two or three separate spot welders depending on the maximum heat load of the welders and resistance to flow through the water circuits.

The system is capable of circulating 120 gal. of water per hour against a spot welder pressure drop of 100 lb. gage. The pump has an adjustable by-pass valve for controlling the rate of water flow through the spot welder assembly.

The cabinet is constructed of heavy gage steel, rustproofed and finished in olive green lacquer. Dimensions of the cooler are 34½ × 42½ × 23 in. deep. Net weight is 500 lb.



Supplies constant flow of low temperature water to tips and transformers; operates up to three separate units

Take a blank of H.S.S. (top) and a blank of mild steel.
Grind contact faces and butt weld them together.
The finished tool is a better tool while saving H.S.S.
No. 3 in a series showing why "TOMAHAWK" tools do a better job of both machining and helping the war effort.

Putting skin on a Cat .....or on a Tool.....

Just as there is more than one way to skin a cat, so there is more than one way to save critical tungsten and still make better tools.

There is a total of less than 2 per cent of critical tungsten in the complete **TOMAHAWK** tool type★ shown at the right. The reason: it has been fabricated by electrically welding High Speed Steel to mild steel, prior to machining, heat-treating, and grinding. The net saving of tungsten usually runs 50 to 75% as compared with tools of solid H. S. S.

The **TOMAHAWK** tool shown is 'hard' where hardness is required (at the cutting edges), and is 'tough' where toughness is important (at the dovetail).

Perfection of welding and heat-treating techniques have been carried to such a point today that failures of such tools at the weld are virtually unknown. Thousands of electrically welded composite steel **TOMAHAWK** tools are now in use in war production industries.

★*Genesee produces a complete line of cutting tools, including H.S.S., carbides, etc. Send for "streamlined" catalog No. GT-42- AM*

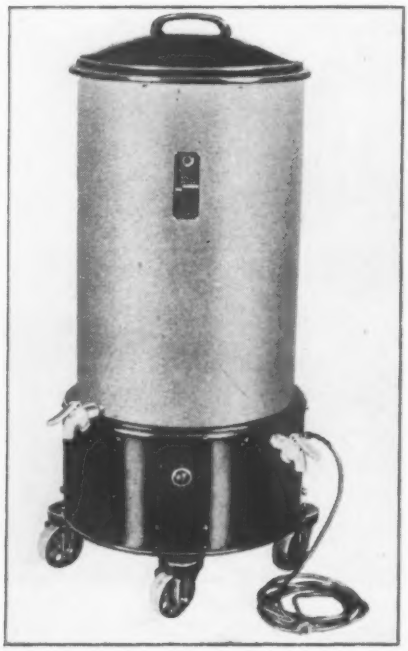
GENESEE TOOL COMPANY

FENTON, MICHIGAN

★ Registered Trade Mark

Circo Makes Dee-Solv Still For Reclamation of Solvents

For the reclamation of oil-laden chlorinated hydrocarbon solvents Circo Products Co., 2835 Chester Ave., Cleveland, Ohio, has introduced the Dee-Solv still. The inner chamber has capacity of 5 gal., while the outer



chamber which holds the distilled solvent has a capacity of 19 gal. Both chambers are provided with drain valves.

The still is furnished with a cover and handle and a pouring funnel with vapor trap. The process of distillation requires about two hours to complete and is indicated by the blinking of the light on the front. The unit is thermostatically controlled to prevent overheating, and operates on 110 volts, 60 cycles, 1 phase a.c., 850 watts. It is 47 in. high, with diameter of 24 in., weighs 140 lb., and is mounted on casters for moving around.

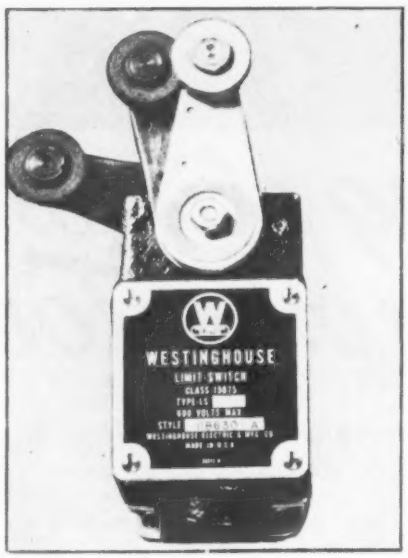
Ross Straddle-Milling Spacer Locks by Inner Locking Ring

The Rousselle Victory adjustable spacer for straddle-milling has been announced by David J. Ross Co., Benton Harbor, Mich. The spacer slips onto the arbor and then is screwed to a setting accurate to 0.001 in. and locked into position by the inner locking ring. Adjustment for length is approximately ½ in.

This spacer is made of hardened and ground alloy steel and accurately threaded and finished. Arbor diameter ranges are 1, 1¼, 1½, 1¾ and 2 in., permitting their use on all standard milling machines.

Westinghouse Limit Switch Suits General Applications

For general purpose applications Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., has announced the Type LS limit switch which is of the roller arm, spring return type. This switch has been designed for making and breaking control circuits or indicating circuits at a fixed point in the operating cycle. Replaceable double break self-aligning silver-to-silver contacts are used. A set of



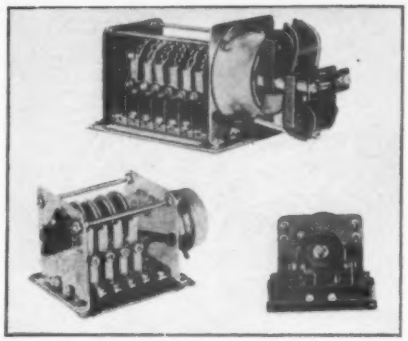
normally open and of normally closed contacts are provided.

The operating arm of the switch can be set in any one of 30 positions and is available in two sizes. The standard arm is 2⅛ in. and the short arm is 1½ in. between centers.

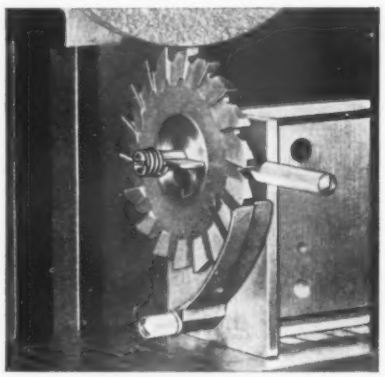
Cramer Multi-Contact Timer Controls Sequence of Operations

A multi-contact timer which automatically controls a sequence of "on" and "off" operations of a single or multiple number of electrical circuits has been introduced by R. W. Cramer Co., Inc., Centerbrook, Conn. The timer is used to automatically reverse or alternate in operation a group of motors, machines or devices.

It is equipped with a self-starting synchronous motor, and Bakelite cams are mounted on the shaft in identical



pairs so that the increments can be adjusted to the desired operating program. The timer is suited for manual operation.



Acro Kutrite Grinding Fixture Positions Milling Cutters, Saws

Kutrite, a milling cutter grinding fixture, has been announced by Acro Tool & Die Works, 5324 North Kedzie Ave., Chicago, Ill. It is said to accurately position milling cutters, circular saws, gear cutters and other cutters on a surface grinder. Adjusting rods permit quick setting for proper angles. Kutrite is made of hardened and ground steel to meet high precision manufacturing requirements.

Nicholson Sharp Tooth File Made for Use on Naval Bronze

A file for use on castings of naval bronze has been announced by Nicholson File Co., Providence, R. I. This file has a sharp tooth which will retain its sharpness and is so shaped that

Your scrap coming in every day helps steel men keep their war-steel furnaces at peak production

COPYRIGHT 1943 — JONES & LAUGHLIN STEEL CORPORATION

FROM AN ORIGINAL DRAWING BY ORISON MACPHERSON

675,000 STEEL INDUSTRY WORKERS SALUTE 130 MILLION AMERICANS

The splendid results achieved by the public in the scrap-metal drives are being manifested 24 hours a day, seven days a week, in the production of more and more fighting steel by America's army of steel workers.

However, need goes on for more scrap to keep war-steel furnaces up to full production. The metal in community salvage piles is being steadily hauled away and prepared by dealers for use in the steel works. Your local scrap heaps are reservoirs that must be kept filled and scrap collections should go on, month after month. The neighborhood scrap piles should not be regarded as unsightly, but as something in which you may take pride as symbols of America's fighting spirit.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH, PENNSYLVANIA

CONTROLLED QUALITY STEEL FOR WAR

J&L STEEL

W-S Standard Reamers with carbide tips. Tapered shank (illustrated) and straight shank types. Sizes: ¼ to 1½.

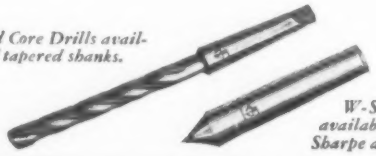
STANDARD CUTTERS
available from stock

REAMERS and many other cutting tools formerly in the "special" class are now STANDARD with us. The majority of these STANDARD cutters is in stock *most of the time.* Our broad line often enables the consolidation of tool orders and saving of valuable time. Each W-S tool is genuine CARBOLOY tipped. The grade used is the one best suited to do a cutting job on the metals for which the tool was ordered. (Other brands of carbide can be specified.)

Carbide tipped tools are not just a specialty with us . . . we make them *exclusively.* You can *expect* and *get* uniform, high quality results with W-S tools. Write for new FREE Catalog 942 and latest prices. WENDT-SONIS COMPANY, HANNIBAL, MISSOURI.

SAVE TIME . . . wire or phone your requirements!

W-S Carbide Tipped Core Drills available in straight and tapered shanks. Sizes: ½ to 1½.



W-S Carbide Tipped Centers available in Morse, Browne & Sharpe and Jarno Tapers.

WENDT W-S SONIS

CARBOLOY CUTTING TOOLS

CENTERS ★ DRILLS ★ CORE DRILLS ★ COUNTERBORES ★ SPOT FACERS
END MILLS ★ REAMERS ★ HOLLOW MILLS ★ LATHE BITS ★ SPECIAL TOOLS

the teeth will not dig into the metal. This results in a good finish and counteracts any tendency of the file to run off to one side. All types and sizes of these files are available.

NEW MATERIALS

Stanicut Line of Cutting Oils Are Available in Five Grades

A line of Stanicut cutting oils in five grades has been brought out by Standard Oil Company of Indiana, Chicago, Ill., which vary in viscosity as well as types and amounts of compounding. Stanicut 62 FC, with low viscosity and light colored, is recommended for machining tough aluminum alloys, and some bronzes. For use in high speed machining operations on free cutting stocks where the requirements are not severe and where a low-cost oil is a prime factor. Stanicut 107BC is recommended. It also is suited in machining copper and brass.

Stanicut 126 BCS is particularly suitable for high speed machining operations where the steel is of lower machinability rating than the free cutting screw stocks. For tougher alloys of the S.A.E. 3000 and 4000 series, particularly those that tend to smear and have a poor finish when using ordinary cutting oils, Stanicut 155 CS oil is recommended. Stanicut 309 BCS oil has been produced especially for heavy broaching, threading and tapping of soft steels. In many cases it may be blended with paraffin oil to handle less severe work.

TRADE PUBLICATIONS

AIRCRAFT TOOLS The 36-page catalog prepared by Aero Tool Co., 231 West Olive St., Burbank, Calif., contains illustrations, descriptions and price lists of production tools for the aircraft industry.

ARC-WELDING ACCESSORIES A 32-page bulletin, GEA-2704B, issued by the General Electric Co., Schenectady, N. Y., presents a complete line of accessories designed to make arc-welding safer and easier.

CUTTING TOOLS A 24-page booklet issued by the Norton Co., Worcester, Mass., entitled "How to Increase Tool Life," contains detailed photographs and descriptions of refined surface finishes as applied to regrinding of metal cutting tools.

EQUIPMENT Catalog 42, published by Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago, Ill., contains 95 pages of illustrations and descriptions of machinery and tools.

GRINDERS The 19-page booklet offered by the McGonegal Mfg. Co., East Rutherford, N. J., illustrates and describes Themac high speed portable electric precision grinders.

MILLING A folder is offered by the Aircraft Machinery Corp., Burbank, Calif., illustrating and describing the Armor universal turret milling machine.

MILLING The Cincinnati Milling Machine Co., Cincinnati, Ohio, has prepared booklet No. M-1160 entitled "Milling With High Speed Steel." This booklet presents a discussion of high speed steel milling cutters, combining the results of extensive research work with practical suggestions in correct shop procedure.

MOTORS To help motor users fill wartime motor needs with the least possible delay, as well as conform to recent WPB recommendations, Allis-Chalmers, Milwaukee, Wis., offers a "Motor Finder" for quickly selecting various types of squirrel-cage motors.

OIL BURNER The 16-page catalog issued by Hauck Mfg. Co., 124-136 Tenth St., Brooklyn, N. Y., gives complete information regarding the proportioning oil burner together with diagrams for automatic control hook-ups and installation pictures.

PRESSES E. W. Bliss Co., Hastings, Mich., has published a 32-page catalog illustrating and describing inclinable presses, and giving dimensions and specifications.

SPEED CONTROL UNITS Folder FSC 198, published by The Smith Power Transmission Co., 1545 E. 23 St., Cleveland, Ohio, describes various applications of Flexoid speed control units.

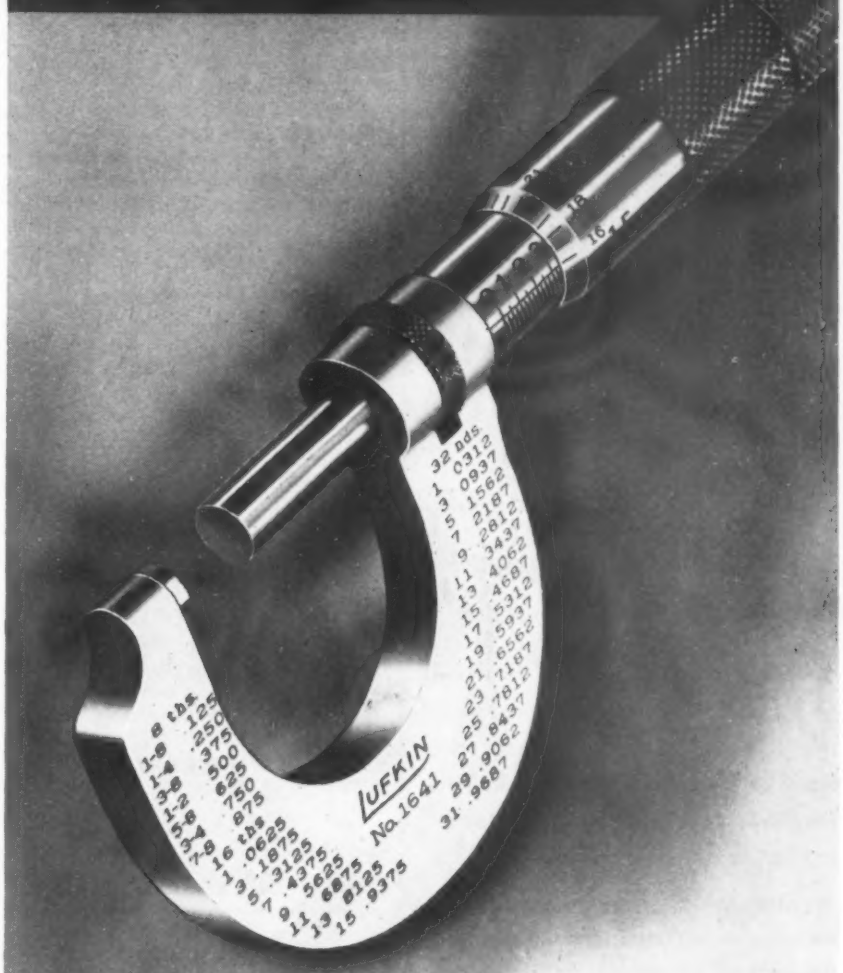
STEAM HOSE Revised catalog section No. 4500, containing rules for the care and maintenance of steam hose and detailed instructions on the proper methods to attach couplings, has been issued by The B. F. Goodrich Co., Akron, Ohio.

STEEL A revised edition of "Handbook of Special Steels," which incorporates all pertinent information on the various grades of stainless, tool, and other special alloy steels, has been issued by the Allegheny Ludlum Steel Corp., Pittsburgh, Pa.

STEELS A simplified data book dealing with the selection and heat-treating of National Emergency steels has been published by Joseph T. Ryerson & Son, Inc., Box 8000-A, Chicago, Ill.

TIN Publication No. 111, "Tin—Base Bearing Metals," records a comprehensive study of the factors governing the adhesion of tin-base bearing alloys to various backing metals, including steel, bronze, copper, brass and cast iron. This booklet, published by the

LUFKIN MICROMETERS



Good tool men the country over appreciate the accuracy and reliability of Lufkin Micrometer Calipers. Lufkin "mikes" are the ideal tool for accurately checking machined parts in which close tolerances are required. Because of their sturdy construction they stand up well under constant use. Because of their design they are easy to adjust and easy to read.

Write for complete catalog 12-c.

BUY THROUGH YOUR DISTRIBUTOR

LUFKIN

SAGINAW, MICHIGAN · NEW YORK CITY

TAPES · RULES · PRECISION TOOLS

OFFICIAL U. S. NAVY PHOTOGRAPH

Back Home He Drove a Tractor

AMERICAN boys now bring their skill to new tasks, and under the scientific, thorough training of the Army, Navy and Air command are handling machines and instruments wherever our forces are fighting.

Fortunately the vast resources of America permit us to furnish them with the best of everything — arms, munitions, and equipment.

Every Department of the Fenn plant is engaged in war production work — just like thousands of other industrial plants, and that is the job ahead. Sometime in the future the skill of our tool makers, machinists and engineers will be turned again to building special machines and other shop work for which FENN is well-known.

FENN

THE FENN MFG. CO.
HARTFORD, CONN.
ESTABLISHED 1900

Tin Research Institute, Fraser Rd., Greenford, Middlesex, England, is available from the Battelle Memorial Institute, 505 King Ave., Columbus, Ohio.

TRUCKS Mercury Mfg. Co., 4118 S. Halsted St., Chicago, Ill., announces a catalog of approved models of trucks, tractors and trailers under the WPB Limitation Order L-112.

WAR WORK The 15-page brochure entitled "Koven Men and Machines for War Work," issued by L. O. Koven & Brother, Inc., 154 Ogden Ave., Jersey City, N. J., presents a comprehensive idea of the facilities, experience and trained workers offered by this company in metal fabricating for both prime and subcontract war production.

WELDING Basic questions and answers about thin metal welding form an important feature of catalog B6049A, entitled "Weld Thin Metals With the Weld-O-Tron," issued by Allis Chalmers Mfg. Co., Milwaukee, Wis.

WELDING Bulletin No. 182, issued by Eutectic Welding Alloys Co., 40 Worth St., New York, N. Y., gives instructions for the use of Castolin Eutectic alloy arc rod No. 24B for welding cast iron.

WOODWORKING Bandsaws, borers and mortisers, cut-off tables and swing saws, jointers, lathes, planers, saw tables, shapers, variety saws and woodworkers are illustrated and described in an 8-page catalog published by Crescent Machine Co., Leetonia, Ohio.

NEW BOOKS

ENGINE LATHE OPERATIONS—*By Graham G. Whipple and Anthony C. Baudek, assistants to the educational director. McDonnell Aircraft Corporation, Lambert Field, St. Louis, Mo.* 158 *pages. Published by McKnight and McKnight, Bloomington, Ill.* $1.60.

The elements of lathe practice are represented in this book in the form of a series of operation units. Problems are presented in simple form and complex problems are avoided.

The book covers all the fundamental lathe operations, from the layout of centers to the cutting of threads. In the process it gives adequate space to such subjects as cutting feeds and speeds, cutting lubricants, and the machining properties of common metals. Rather more space is given to the descriptions of the common measuring tools than is common in a book on engine lathe practice. As each type of cutting tool is used, its form is discussed and the methods of grinding it fully covered. This is particularly apparent in the section on threads where the various external and internal threads are discussed, and the methods of turning them presented. The book ends with a short discussion of the heat-treatment of carbon tool steel.

The book is paper bound in a large page size. It is fully illustrated with pictures drawn from the literature of the chief lathe and tool manufacturers and other illustrations prepared for the individual volume. The ten job projects are presented at the end of the book in blueprint form. Tables of various sorts are scattered through the volume at appropriate places.

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INDUSTRIAL GUARD'S MANUAL—*By Harry Desmond Farren, Author of Sabotage—How To Guard Against It.* 95 *pages, published by National Foremen's Institute, Inc., New York, Deep River, Conn., and Chicago.* $1.25.

In this short book the author shows how the shop guard fits into the wartime picture of plant protection. There are short chapters on public and worker contacts, riots, self-protection, first aid, fire protection, sabotage, espionage, plant protection, bombs and infernal machines. The presentation is rather emotional, but much valuable advice is given in specific sections. The section on self-protection contains material very similar to that in the many books which have appeared recently on "getting tough with our enemies."

•

PROBLEMS IN BLUEPRINT READING—*By Drew W. Castle, vocational director, Joliet Township High School and Junior College, Joliet, Ill. Edited by R. W. Selvidge, late professor of industrial education, University of Missouri.* 93 *pages. Published by the Manual Arts Press, Peoria, Ill.* 96 *cents.*

For the revised edition of this established book on blueprint reading, new and improved plates have been made to give blacker outlines on the drawings. New problems have also been added. As in the earlier editions, the general information is given briefly in the first 22 pages, the remaining 70 being devoted to the problems. The problems, which are typical of industrial situations, vary from simple blocks to complex assembly drawings. In the problem section, alternate cross-ruled pages are supplied for the student's use in working out the solutions.

•

METHODS OF MEASUREMENTS—*By Wendell H. Cornetet, head of the department of vocational science, East Huntington Trade School, Huntington, W. Va.* 134 *pages. Published by McKnight and McKnight, Bloomington, Ill.* 80 *cents.*

Most of the forms of measurement with which vocational shop students will have to deal are treated in this new book. It begins with the simple linear tools such as rules and calipers, then goes on to micrometer and vernier

tools. In dealing with geometrical measurements, such angle measuring tools as the simple and bevel protractors are introduced. In a section on gages, the dimensions and types of various sorts of fasteners are discussed. Included among them are screw threads, various types of screws and bolts, and wire nails. At the same time, drill, wire and sheet metal gages are introduced. From gages the author goes on to such non-dimensional measurements as density, gravity, weight, heat, and such special properties as tension, bending and torsion.

The book is printed on a 7×10¼ page and is paper bound. Many of the problems are designed to be answered directly in the book. Since the subjects are treated in the simplest fashion, each section contains a number of references to standard text books. In the end matter are included various reference tables; among them the English and metric systems of measures, decimal equivalents of fractions, wire gage tables, various useful formulas, tables of specific gravity and heat constants, and a temperature conversion chart.

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UNITED STATES GOVERNMENT MANUAL, Fall 1942—*Published by the Bureau of Public Inquiries of the Office of War Information, Washington, D. C.* 704 *pages. For sale by the Superintendent of Documents, Government Printing Office, Washington, D. C.* $1 *per copy,* $2.75 *per year.*

The fall issue of the Government Manual, which appears three times a year, is now available with revisions to September 1, 1942. As usual, besides the literal reprint of the Constitution, the issue contains a section on the federal courts and comprehensive statements on the ten executive departments, the Federal Security Agency, the Federal Works Agency, and the independent establishments. Large sections of the book are devoted to the emergency war agencies directly under the President, and to the wartime functions of the other departments. There is a 27-page appendix of executive agencies and functions which have been abolished or transferred since March 4, 1933.

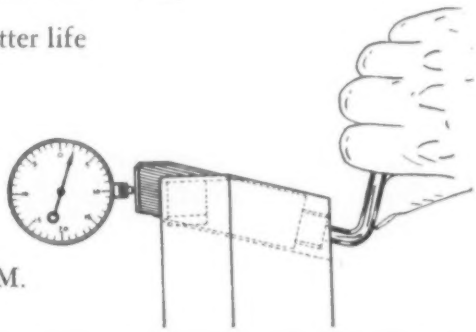
•

SIMPLIFIED INDUSTRIAL MATHEMATICS—*By John H. Wolfe, supervisor of Ford Apprentice Training, Ford Motor Company, Dearborn, Mich., William F. Mueller, principal of Ford Aircraft Apprentice School, Ford Motor Company, Dearborn, Mich., Seibert D. Mullikin, principal of Ford Airplane Apprentice School, Ford Motor Company, Willow Run, Mich.* 281 *pages. Published by the McGraw-Hill Book Co., 330 W. 42 St., New York, N. Y.* $2.

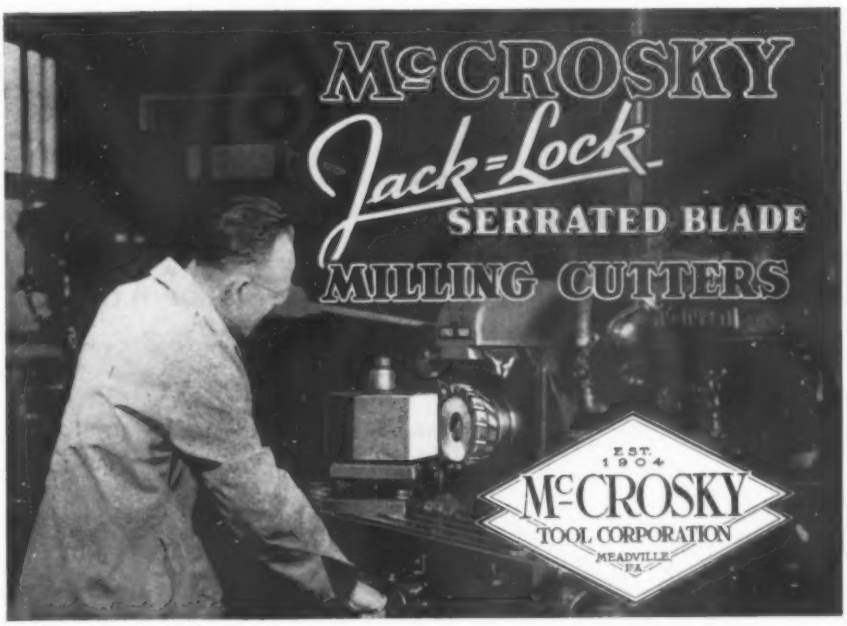
This book was designed to present the essentials of elementary industrial mathematics in as short a time as pos-

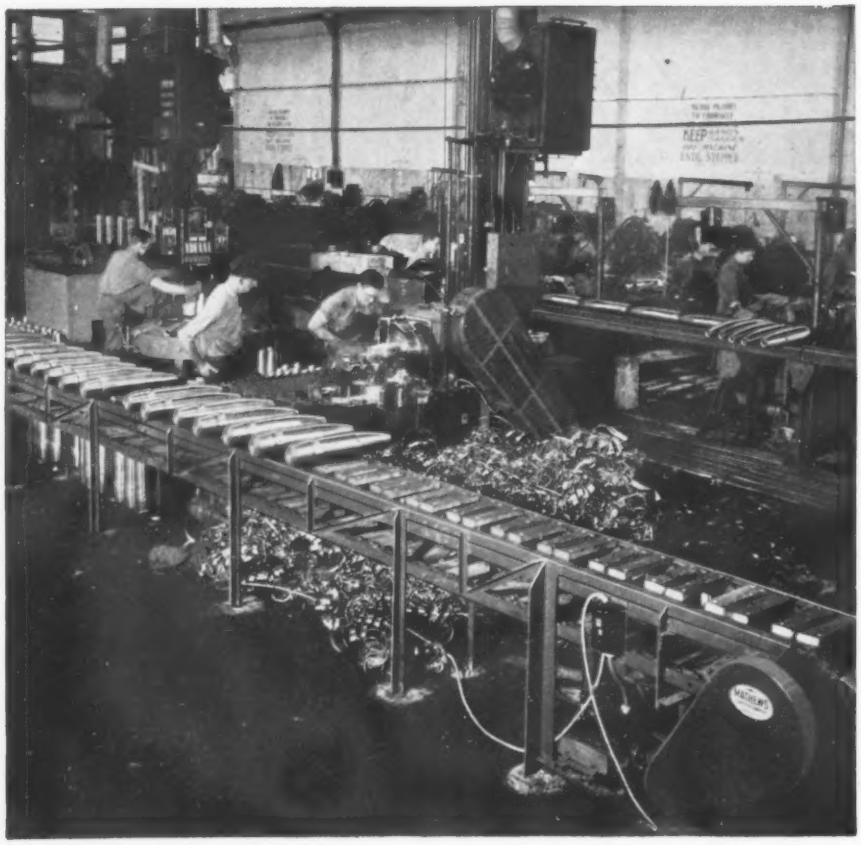
A
McCROSKY
TIME-CUTTER

Here's a McCrosky
Series "C" Face-Milling Cutter—
expertly designed and ruggedly built
for the high pressure of war-time production.
McCrosky JACK-LOCK wedges can be quickly
locked and unlocked. An individual adjusting
screw behind each blade permits blades
to be adjusted easily and *UNIFORMLY* (see line-drawing)
so that a minimum of blade stock is sacrificed
in resharpening. High-speed steel is conserved,
and down-time is shortened. Cutter life
can be renewed many times
by inserting new blades
in the original body.



WRITE FOR BULLETIN 16-M.





SHELL PLANTS DEPEND ON

MATHEWS

Conveyers

● Mathews engineering hours are reserved these days for manufacturers of war materials. Makers of munitions in the United States and Canada are watching production figures rise — assisted by Mathews Conveyer Systems. Perhaps you've overlooked an opportunity to "Keep 'em Rolling" faster by not taking advantage of the experience of your Mathews Engineer. If you have, a wire or a letter will bring complete information as to how Mathews can best serve you.

MATHEWS CONVEYER COMPANY

ELLWOOD CITY, PENNA.

Field Engineers and Sales Offices located in 30 Industrial Centers

DOUBLED CAPACITY FOR WAR PRODUCTION

Stepping up our productive capacity month after month has barely enabled us to keep pace with mounting war orders. As long as this condition exists, it becomes increasingly difficult to meet civilian requirements. Our one big job is the handling of war material. That job must come first.

sible. It gives a brief practical presentation of all the phases of simple mathematics, covering common fractions, decimals, square roots, ratio and proportion, percentage, and the nature and grouping of formulas. It also contains three chapters on geometry and trigonometry. The geometry is presented in the form of axioms and propositions with no proofs. The problems are given in the practical application of geometric theorems. Material in the two chapters on trigonometry is presented in much the same way. The book does not go into the derivation and manipulation of trigonometric formulas, but concentrates on the solution of right and oblique triangles. Practice is given in the solution of simple layout problems by the use of geometry and trigonometry.

Besides discussing general mathematics, the book has sections on particular machine shop problems. There is a chapter on the nature and uses of rules, micrometers, and vernier tools, and a chapter on the solution of taper problems. There is an explanation of screw thread nomenclature containing descriptions of all the types of threads and classes of fits. The final chapter on gears covers that subject adequately. The book has a compact and attractive format. In the back matter answers to all problems are supplied and tables of the natural trigonometric functions are given.

•

DIE-CASTING FOR ENGINEERS—*By New Jersey Zinc Company. 148 pages. Published by the New Jersey Zinc Company, 160 Front St., New York, N. Y.* $1.

An impartial analysis of all the many alloys used in die-casting practice is included in this new book. This information should be of interest to students as well as practicing engineers. Not only zinc, which is the specialty of the authors, but aluminum, magnesium, copper, lead and tin alloys are discussed. Besides treating the alloys used, the volume contains full discussions of the elements of die construction, finishes, and design of castings; and surveys of the history and principles of die-casting, its applications, methods and tools for flash removal, and inspection. Short sections on specifications and machining are supplemented by bibliographies drawn from ASTM publications and manufacturer's literature.

The text is exceptionally well illustrated with photographs and line cuts; all material which adapts itself to the technique is presented in tables.

The picture-story method is appropriately used to give a clear presentation of the material on jigs and fixtures. In the chapter on this subject the material is presented in the form of 15 clear photographs, each of which occupies a half page or more. Discussion of each fixture is included in the space directly under the photo-

graph, so that ready reference to the illustration is possible. The photographs illustrate widely varying types of fixtures and offer an idea of the scope and possibilities in die-casting work of such machining aids. Drilling, tapping, boring, reaming, milling, sawing, riveting, and various complicated combined fixtures are shown.

•

ENGINEERING MECHANICS—*Bevis B. Low, lecturer in mechanical engineering, Military College of Science, London, England.* 252 *pages. Published by Longmans, Green & Company, Inc., 55 Fifth Ave., New York, N. Y.* $4.50.

The title "Engineering Mechanics" has been chosen in order to avoid confusion with D. A. Low's "Applied Mechanics," to which this book is intended to be a companion volume. However, this book is complete in itself, although reference is made to "Applied Mechanics" in a few places to avoid unnecessary duplication.

The book is chiefly concerned with kinematics and dynamics, including instantaneous centers, velocity, and acceleration diagrams, analysis of cams, motion of rigid bodies in two dimensions, and vibrations of various kinds. In view of the importance of dimensions and dynamical similarity, a chapter is devoted to these subjects. The deflection of beams is dealt with, some knowledge of this being required in the study of certain vibration problems.

The chapter on the deflection of beams is complete in itself, but to some extent it supplements the corresponding chapter in "Applied Mechanics." Each problem is examined from first principles, and the Macaulay method is explained with examples. There are numerous work examples in the text, and in many instances the exercises which follow most of the chapters will be found to amplify the text.

•

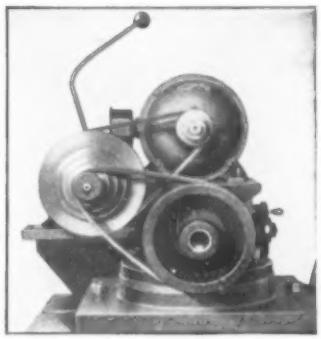
ENGINEERING DRAWING—*Leon Marr Sahag, professor of machine design and drawing, Alabama Polytechnic Institute.* 394 *pages. Published by the Ronald Press Company,* 15 *E.* 26 *St., New York, N. Y.* $2.75.

The ideas, methods and materials offered in this textbook cover industrial and teaching drawing practice. It offers the maximum of training in the minimum of space and time. It has a number of features which contribute to this accomplishment:

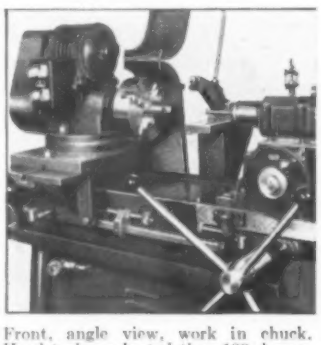
The author has made a definite effort to avoid too many elementary figures in classroom problem work, and to make the descriptions as brief as possible, eliminating non-essential text and demonstrating the theory by sufficient illustrations. Treatment of advanced or specialized topics is referred until a thorough coverage of the fundamental work is completed.

The problems are so selected that the student progresses rapidly through

Looking down, from grinder head end.



Looking from headstock end, guard removed; note step pulleys providing various work head speeds. Headstock may be slid crosswise any desired distance up to six inches.



Front, angle view, work in chuck. Headstock graduated thru 180 degree.

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Just as Management Engineering is helping win the war, it will help win the peace.

When the present war broke out, every one of our clients was faced with war contracts . . . problems involving conversion for maximum production in minimum time with existing facilities and without undue expense. Because of experience gained on the fighting fronts, reconversion has been necessary for many of these clients in order to meet improvements in armament and the shifting to new types. It has been our job to help with all of these problems.

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fundamentals to the point where he can put the theory into practice. The routine in preparing drawings is planned to follow the same procedure as used in industry. From the standpoint of technique, the finished drawings and notations on them are in accordance with the rules approved by the American Standards Association. The course, when completed, should qualify students to go into more advanced design work.

The text is divided into three parts: Elementary, intermediate, and advance, with a logical sequence of chapters in each part. The first two parts include what will be required in any basic course. The third part, however, is arranged to suit local conditions. For instance, in many schools where it is not practical to go into descriptive geometry extensively, the chapter on developments, sections and inter-sections of solids will be found sufficient for their purposes.

SEEN and HEARD

By JOHN R. GODFREY

Induction Hardening

Probably no shop operation has undergone more changes than that of hardening. It is a far cry from the open blacksmith's fire to the latest induction hardening apparatus. In between are the many types of furnaces in which both the heat and the atmosphere are controlled, as well as the more or less automatic apparatus that has done so much to give us uniformity of product.

Induction hardening promises to make a decided change in many of our shop practices. It is a rapid method of heating and quenching work to be hardened and seems to secure a uniformity in the depth of hardness that has never before been attained. One enthusiast believes that it may result in making it possible to use cheaper and less critical steels in parts of many machines.

In any case, it hardens work with little distortion or scale and at a low cost. These three items alone make it something that all production men and shop managers must consider carefully. Even at a higher cost, freedom from distortion and scale are much to be desired as they both play a major part in further cost as well as in parts rejection and salvage.

Auto Transmissions on Machine Tools

Proof of the stamina that is built into the transmission of inexpensive automobiles may be found in many machine shops in the South and Southwest. Such units are mounted on lathes and other machine tools to convert them into motor drives.

With a lathe having a four-step cone, a three-speed transmission gives twelve speeds on direct drive and twelve more through the back gear. In addition the reverse gear may be used with any step of the cone.

On one large Gisholt turret lathe of ancient vintage, all the regular gearing had been removed. A six-speed truck transmission behind the machine drives the spindle through multiple V-belts and gives all the power needed. A well made plate steel cover incloses the mechanism to make the headstock look like that on a modern lathe.

Modern Abrasives

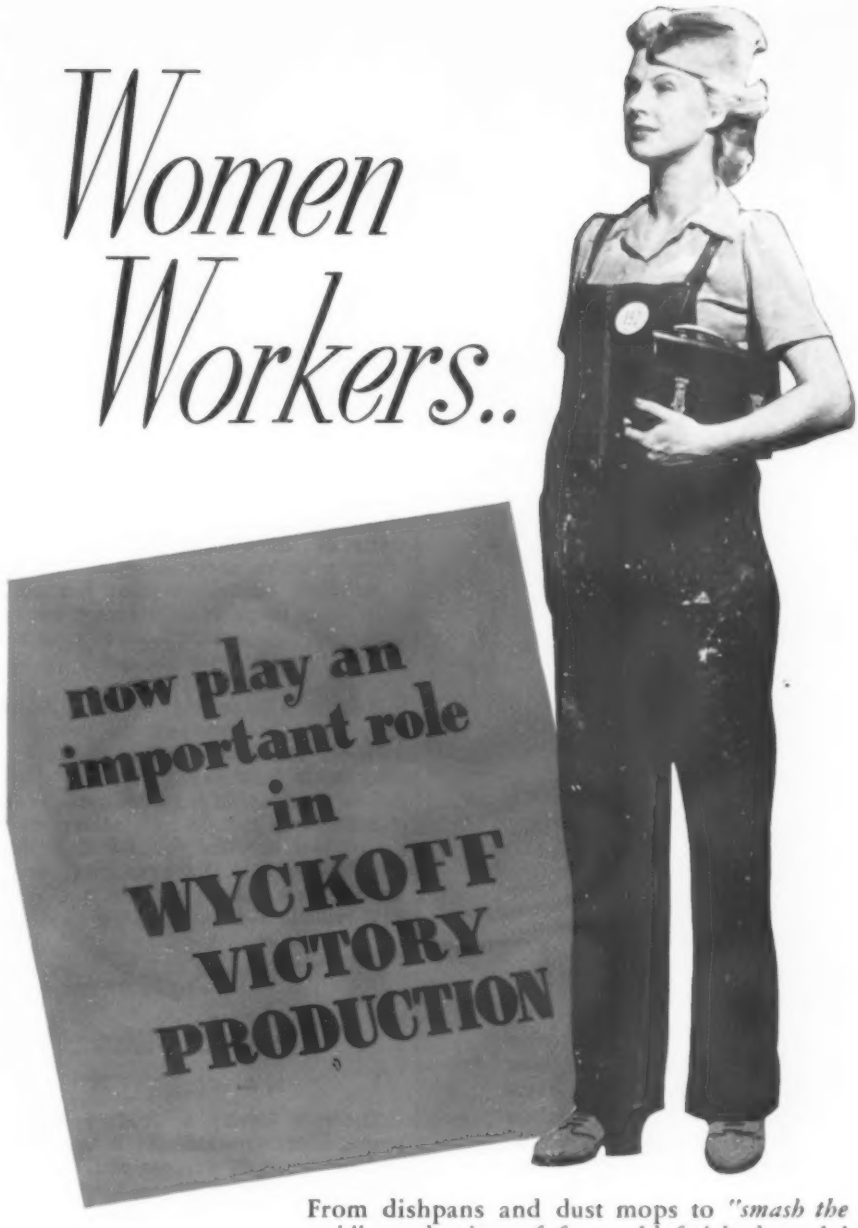
When emery wheels began to take the place of the old grindstone, we had little choice as to the kind of wheel we could get. Of course some were finer than others but we never dreamed of getting wheels made for particular jobs. Then came the artificial abrasives and emery began to take a back seat. Different makers experimented with various types of bonds and methods of producing wheels for special purposes. Now we have wheels for heavy roughing cuts on castings or forgings as on a Blanchard machine, and the undreamed of finishes we can now get on gaging surfaces with proper wheels. Honing imposes a different problem on the makers of abrasive stones.

All these demands, or opportunities, have resulted in research by makers of abrasives until they now supply "tailor made" stones for honing as well as wheels for almost any condition that may be demanded. In a somewhat similar manner, makers of abrasive paper or cloth have developed products that stand more abuse and produce more work than we ever dreamed possible before. We used to think that a grinding wheel "worried" the metal off the work and was mostly for polishing. Now we know that each grain cuts a real chip and cuts it so rapidly that the total chip removal comes in the "machining" class.

Metallizing

One of the best examples of extreme deliberation in adopting new methods is that of metallizing what now seems to be coming into its own. It came to this country from Germany over 40 years ago, as the Schoop process. The first demonstration I saw was the coating of a pair of "baby's first shoes" with copper to preserve them as a souvenir. Previously this had been done occasionally by electroplating. The process was introduced by a firm in Philadelphia but made very slow progress—and seemed to be practically forgotten.

When in California in the winter of 1931 I found considerable activity in one or two small shops which were trying to introduce it as a means of building up worn shafts and other



From dishpans and dust mops to *"smash the axis"* production of fine cold finished steels!

Yes, indeed, the true American spirit! Now approximately 20% of the workers at Wyckoff are women and they are doing a splendid job while Wyckoff men are on fighting duty throughout the world.

This *living, fighting spirit* is traditional at Wyckoff in both men and women . . . as signified by the distinguished joint awards — the Bureau of Ordnance Flag and the Navy "E" Pennant, the All-Navy "E" Burgee, the joint Army-Navy "E" Production Award *with added Star*. These awards are constant reminders of well-done jobs — and still greater accomplishments to which we are pledged, and *will achieve*.

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parts. Since then its use seems to have been accelerated more than in all the time previously since it was brought to this country. We now see it used in railroad and other shops in places where smaller "build-ups" are needed than those where the welding torch is used. Probably some of its slow growth is due to the care needed in finishing it to size. For it is only a mechanical bond and can be peeled off with a dull tool. But it seems to be finding a place as a "putting-on-tool" about which old time machinists used to kid each other.

Many Machines Still Idle

Subcontracting requires good management on the part of the prime contractor. In the face of the wide use of small shops as subcontractors in many parts of the country, there are still many machine shops standing idle.

A prime contractor must not only find small shops to do his work but in addition must instruct them in machining and seeing that the parts go together in assembly.

Engineers inspecting the facilities of potential subcontractors are prone to look for the same kind of equipment they use in their own shops. They often fail to realize that a good mechanic in a small shop can do satisfactory work on entirely different equipment. Prime contractors who have learned what small shops can do if given a chance find reliable sources of supply in many unusual places.

The Babbitt Problem

By A. HOYT LEVY

There is hardly a product in the manufacture of which tin is used that will not serve its purpose with a lower tin content. One such product is babbitt metal. The one used originally by Isaac Babbitt contained close to 90 percent tin. Although there have been numerous bearing metal formulas with lower tin content since then, manufacturers of heavy-duty and high-speed machinery have continued to line their bearings with babbitts containing from 80 to 90 percent tin. When the War Production Board decreed that no babbitt be manufactured or used, except for implements of war, with more than 12 percent tin, substitutes for tin-base babbitts appeared as from the thin air.

Some of the so-called tinless babbitts substituted alkali earth for tin. A very small amount of barium and strontium added to lead produced an alloy which had many of the characteristics of tin-base babbitt; however, a special technique is required for using it to line bearings, as a result of which it is not accessible to the large majority of babbitt users. Several babbitt alloys appeared consisting of lead toughened with magnesium calcium or sodium in various proportions and combinations. Although this alloy possesses certain

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properties apparently similar to those of tin-base babbitt, it has not proved satisfactory for bearing service due, in part, to the high temperature required for pouring the metal, its heavy drossage and its deterioration when exposed to air.

More recently, arsenic added to antimonial-lead with a fractional percentage of tin has been used with fair success. This babbitt, which depends mainly upon its hardness induced by its arsenical content, may be used in steady bearings carrying a heavy load, but is not comparable to a tin-base babbitt, or to a babbitt carrying tin approximating the permissible 12 percent.

It is the writer's opinion that the tin content could be lowered a couple of more notches, for it has been fully demonstrated that a eutectic 10 percent tin-antimony-lead formula, toughened with copper and scientifically alloyed, is close in its capabilities under load, shock and speed, to a tin-base babbitt. The tin-antimony cubical crystals in this eutectic alloy help materially to resist the shock to which heavy-duty bearings are subjected—a factor not possessed by tinless babbitts, obviously because of the complete, or almost complete absence of tin. It requires no special technique to cast a solid bearing with this babbitt. The casting temperature is aboubt 700 F. in contrast to about 1,000 F. required by most of the arsenical bearing alloys which contain 1 percent tin or less.

It is not to be inferred from the foregoing statement that this babbitt with 10 percent tin is the equal of tin-base babbitt for every bearing service. While it will perform satisfactorily in most bearings heretofore lined with tin-base babbitt, and in many bearings prove more satisfactory because of its lower coefficient of friction, the tin-base babbitt with its larger number of tin-copper interlocking needle crystals in which are entwined the cubical shaped crystals, is less liable to distortion when subject to extreme pound. However, such cases of extreme pound are comparatively rare. But even in these rare cases where the impact, or the load is such as to necessitate a high-tin-base babbitt, I venture the opinion, based on past performances, that a babbitt with a maximum of 75 percent tin, correctly balanced with antimony, copper and lead and properly alloyed, will perform satisfactorily; that is, it will not crack under intermittent shock, will not heat under high speed, and will not distort or squeeze out under heavy load to any greater extent than will a babbitt with a higher tin content and free from lead. Such a babbitt does not require prime virgin tin, but can be alloyed from refined scrap used as a base.

The babbitt situation under present tin restrictions is not a great hardship to babbitt users. It can be further eased by conscientiously preventing all waste. This means, pick up all spatterings which can be remelted with the turnings and risings. The spatterings will contain dirt. The turnings, where the shells are iron or steel, will be con-

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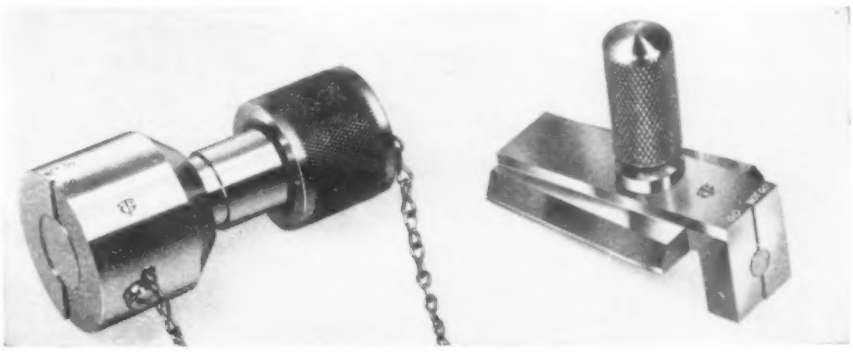
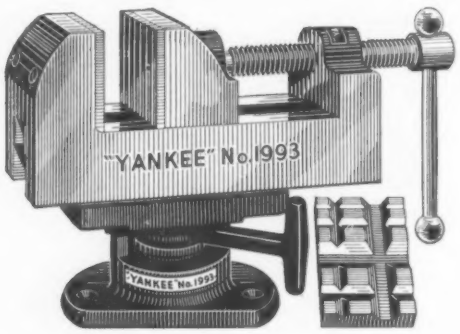


Calling all "hands" to faster production



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make good mechanics better
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Established 1880

taminated with ferrous metal. The dirt and ferrous impurities, however, will come to the top with the dross. Sprinkle a reducing flux over the dross. This will bring out the dirt and salvage the free metal in the oxides. Collect the dross in a container until there is enough to warrant shipping to a smelter who will put it through a reverberatory furnace for further salvage. Use scrupulous care to clean off every speck of rust, dirt or oil from the shells before tinning.

Macrome Treatment Improves Life of Cutting Tools

By E. R. YARHAM, Roughton, England

A steel treating process which is not an ordinary hardening, tempering or deposition process, and has no connection with chromium plating, has been developed by Macrome Limited in England. The entire bulk of the steel part is affected and the benefits are maintained throughout the life of the part without any need for further treatment. At present the process is being applied to cutting tools and many other steel articles subject to wear, fatigue or breakage. Among these are armor plate and switch rails.

The treatment is applied to cutting tools after the usual hardening and tempering operations, when the tools are usually regarded as ready for use. The technical details of the process, applied only by Macrome Limited, are not available, but the benefits obtained are apparent from various reports on tests which have been carried out. The treatment causes no distortion, and no alteration to the structure or hardness. Tools do not require retreating after regrinding, which is carried out in the usual way without need of special methods or equipment. The treatment can be applied to all types of carbon and high-speed steel tools, including drills, taps, reamers, saws, threading dies, hobs, broaches, milling cutters, files and turning tools.

Increased speeds and feeds are recommended for Macrome-treated tools. In addition, these tools require less frequent regrinding than do untreated tools. Considerable time is saved and production is increased. Major savings in tool costs are possible because the cost of treatment is negligible as compared with the increased output obtained.

One firm using drills treated with this process reports that drills used to form a 1¾ in. diameter and 8 in. deep cavity in shells now require only one regrinding in 18 hours, whereas before treatment it was necessary to grind each drill after about three hours of use. In the case of high-speed steel turning tools for shell manufacture, one user reports that the average output per turning tool was 525 shell before treatment, and 2,743 shell after treatment with the Macrome process.

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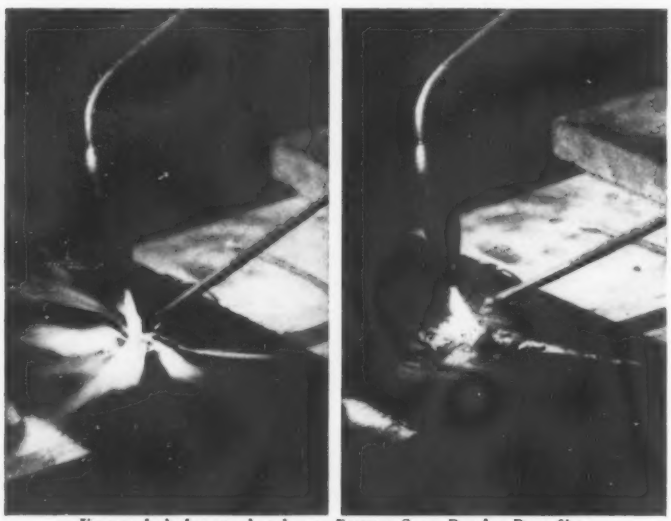

Unretouched photographs taken on Eastman Super Panchro-Press film.

HERE'S WHAT THE WELDER SEES

Left: Photograph taken through Noviweld lens—the "sodium flare" obscures the rod and bead. *Right:* Photograph taken through Noviweld-Didymium lens—note how the "sodium flare" has been screened out, revealing the entire working area in sharp relief.

Noviweld-Didymium lenses, developed by American Optical Company, mark a major advance in the science of glare control. In all types of flame-welding, these new lenses provide a clearer view of the working area by cutting down the vision-obstructing rays of the sodium flare.

Welding goggles equipped with Noviweld-Didymium lenses enable a flame-welder to look right through the cloudy yellow flame of burning sodium vapors, and thus see the rod and the molten area more sharply. This clearer vision increases his efficiency in every phase of the welding operation. He can turn out more work and better work, with complete eye protection and comfort.

The first welding lens to possess these properties, combined with adequate protection, Noviweld-Didymium is manufactured under strict laboratory control and held to the same high standards of uniformity as Noviweld and Calobar. Noviweld-Didymium lenses are available in the standard shade numbers 4, 5, and 6. For convincing demonstration, call in your American Optical Company Safety Representative.

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Speed up all metal cleaning, sanding, filing, grinding with wire brushes (*illustrated*) cup wheels, polishing pads, etc. 6 MODELS.

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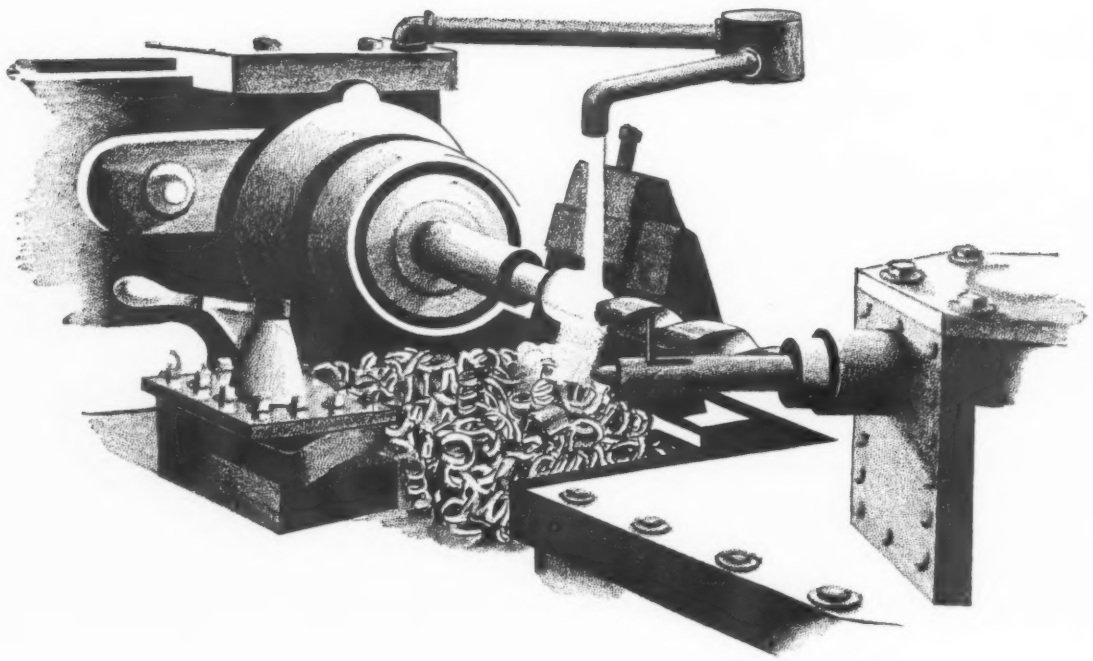
★ MAKE AMERICA'S HANDS MORE PRODUCTIVE ★

Keep The STUTTER

Out of Your CUTTER



. . . Best bet is to check your cutting fluid. For while there are many machining operations, there can be only one *correct* cutting oil for your particular job. That's the coolant that delivers the "tops" in speed, finish, and tool life.

The difference between a "top" lubricant and one of ordinary quality means much these days of high speed, precision production. Particularly because many manufacturers are working many different types of materials, each presenting a new cutting oil problem. Cities Service Chillo Cutting Oils and Cities Service lubrication engineers have solved many of these problems and are continuing to do so daily. Why not find out what this combination will do for you? A consultation will cost you nothing. A copy of a new booklet, on "Metal Cutting Lubrication," will be sent free to users of cutting oils.

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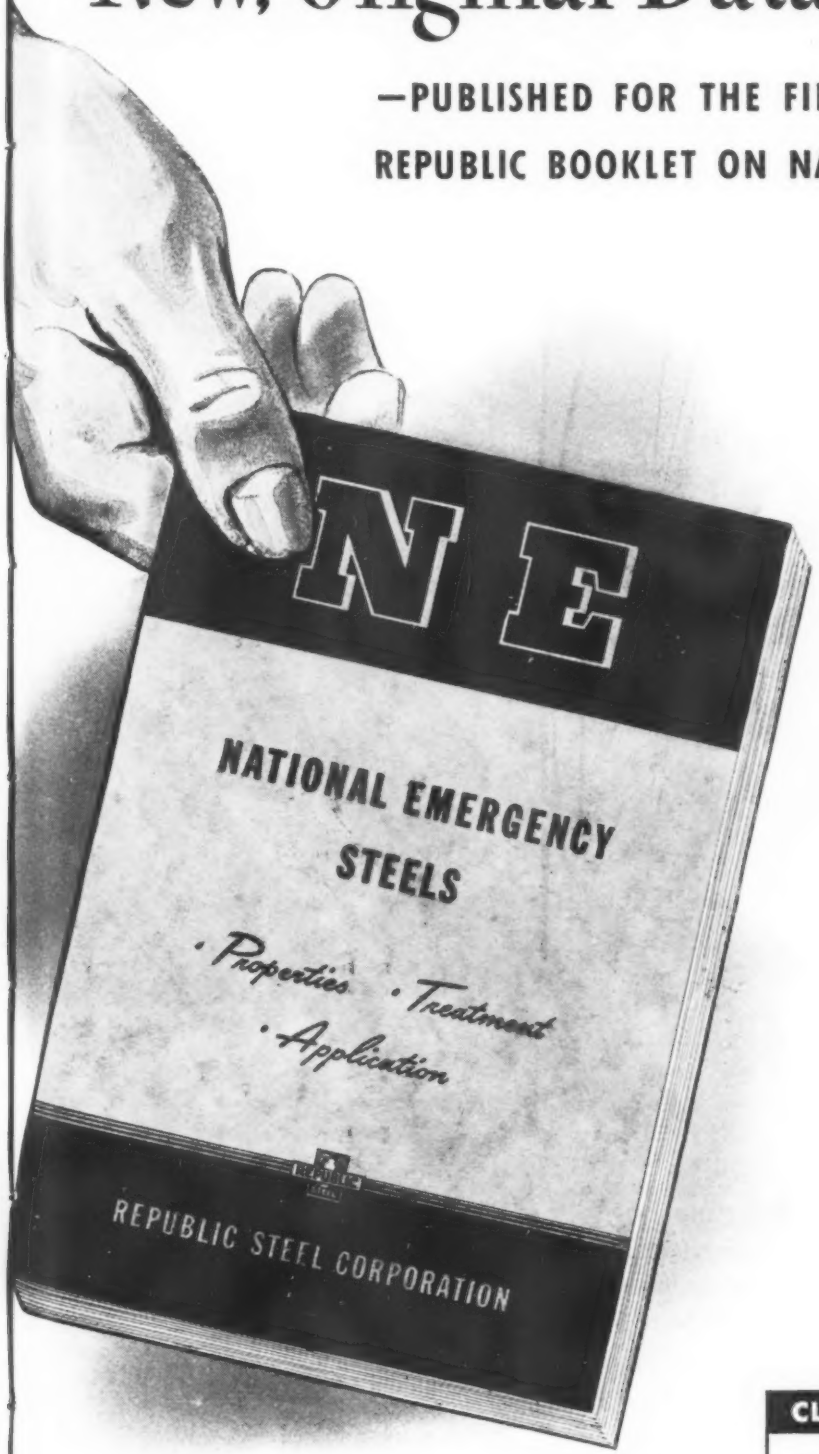
New, Original Data on NE Steels

—PUBLISHED FOR THE FIRST TIME IN THIS HELPFUL REPUBLIC BOOKLET ON NATIONAL EMERGENCY STEELS



Here's just what you've been looking for—70 pages of valuable *new* data on the properties, treatment and application of the NE Steels—in handy, usable book form.

Much of the material in this book—charts, tables and specifications—has been prepared from original research conducted by Republic metallurgists. There's an explanation of the end quench hardenability test and its importance, too.

Republic—long a leader in alloy steel production—was an important factor in the development of the NE series. Now, Republic offers this helpful book on NE Steels as its contribution to more efficient, more productive, faster war fabrication wherever these alloy-conserving steels are applied.

If you have been using alloy steels, you probably are now using NE Steels—or will in the near future. You should have a copy of this book at your finger tips. You'll be surprised at the vast amount of data it will bring you. Printing is now under way, and the book will soon be ready for distribution to *engineers, metallurgists and production executives.* Send your request now to insure early delivery.

REPUBLIC STEEL CORPORATION
Alloy Steel Division
Sales Offices • Massillon, Ohio
GENERAL OFFICES • • CLEVELAND, OHIO
Berger Manufacturing Division • Culvert Division
Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company
Export Department: Chrysler Building, New York, New York

CLIP, FILL IN AND MAIL TODAY FOR NE DATA

Republic Steel Corporation, Department AM
3100 East 45th Street, Cleveland, Ohio.

Please send me a copy of your new NE Steels Handbook, which I understand will be off the press shortly.

Name _____ Title _____

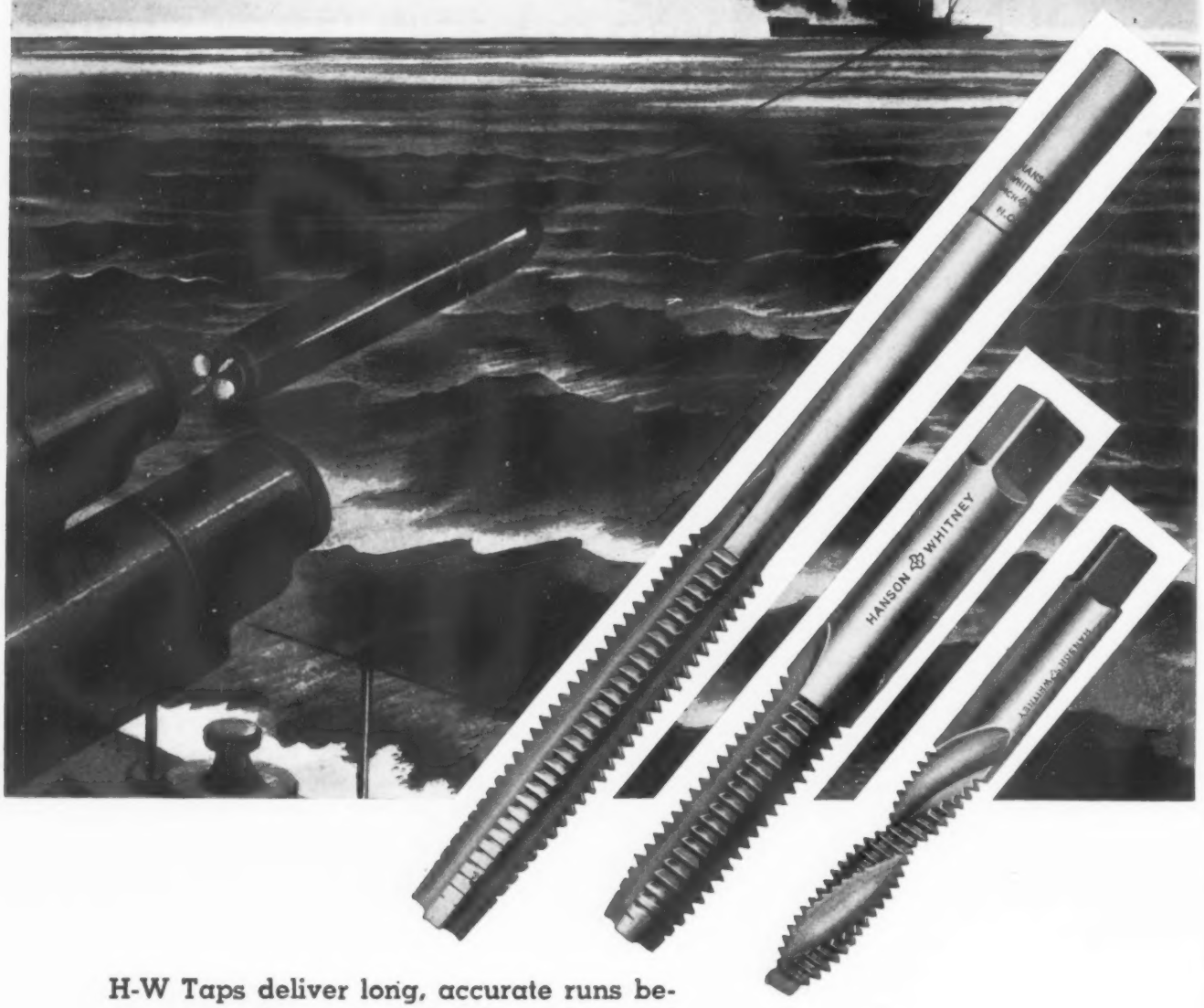
Company _____

Address _____

—REPUBLIC—
Alloy STEELS

Would you like data on other Republic products—Enduro Stainless Steel, Sheets, Plates, Upson Bolts, Nuts and Rivets, Hot Rolled and Cold Drawn Bars, Electrunite Aircraft and Mechanical Tubing? Write us.

ON THE TARGET



H-W Taps deliver long, accurate runs between grinds . . . minimize down time and reduce rejects. And H-W Taps retain precision longer . . . because the "Hanson Process," our exclusive method of finishing after hardening, insures uniform grain structure from tip to shank. Speed up production by looking for the "Hanson Process" Emblem on the taps you buy. For more detailed information please write.

"HANSON" PROCESS

LOOK FOR THIS EMBLEM

The HANSON WHITNEY MACHINE CO

HARTFORD CONN., U.S.A.

SAE 4130 aircraft screw ⅞" hex. head, ⅜" body, 2" long, threaded 1" on Model B Cleveland Single Spindle Automatics. Tool-life increased 25% . . . using *Texaco Sultex B.*

CHANGING cutting coolants on this job of machining Molybdenum steel aircraft screws produced as good a finish, but TOOL-LIFE increased 25%.

The cutting coolant that made this substantial improvement was *TEXACO Sultex Cutting Oil B.*

This is one more instance of the fact that the selection of *Texaco Cutting Oil* not only can increase tool-life, but by keeping down the heat, can prevent chip welding, improve finish, reduce tool adjustment, minimize spoilage.

The outstanding performance that has made Texaco preferred in the fields listed in the panel has made it preferred by prominent users in the metal-cutting field.

Texaco users enjoy many benefits that can also be yours. A Texaco Engineer specializing in cutting coolants will gladly cooperate . . . just phone the nearest of more than 2300 Texaco distributing points in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York, N. Y.

THEY PREFER TEXACO

★ More buses, more bus lines and more bus-miles are lubricated with Texaco than with any other brand.

★ More stationary Diesel horsepower in the U. S. is lubricated with Texaco than with any other brand.

★ More Diesel horsepower on streamlined trains in the U. S. is lubricated with Texaco than with all other brands combined.

★ More locomotives and cars in the U. S. are lubricated with Texaco than with any other brand.

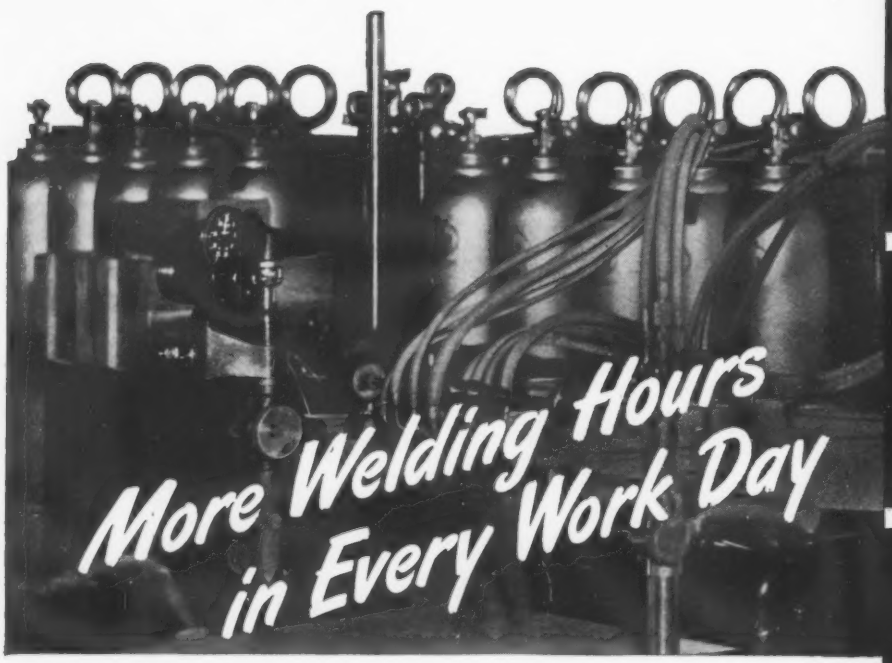
★ More revenue airline miles in the U. S. are flown with Texaco than with any other brand.

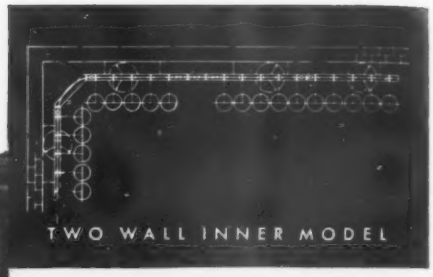
TEXACO

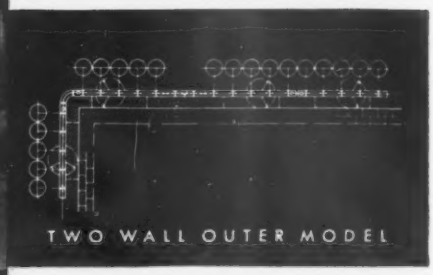
REG T M

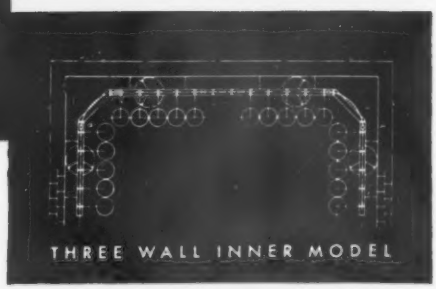
TEXACO Cutting and Soluble Oils
FOR FASTER MACHINING

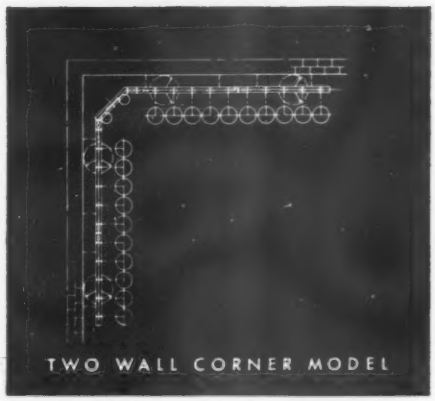
TUNE IN FRED ALLEN EVERY SUNDAY NIGHT—CBS ★ HELP WIN THE WAR BY RETURNING EMPTY DRUMS PROMPTLY

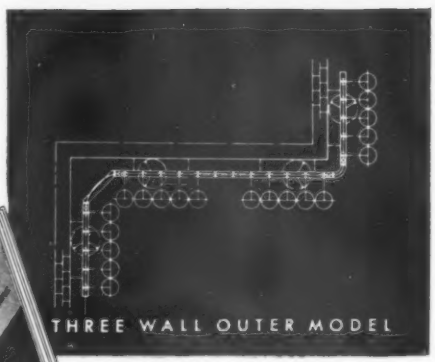












WITH AN AIRCO MANIFOLD SYSTEM FITTED TO YOUR FLOOR SPACE . . .

Installing a modern Airco oxygen and acetylene cylinder manifold system in your welding shop no longer requires extensive alterations in shop layouts. Manifolded cylinders can be arranged in a number of ways to meet your individual requirements. Some of the possible layouts, illustrated in these diagrams, indicate the variety of cylinder arrangements that can be made with standard Airco equipment.

Manifolds offer many advantages to plants that do considerable gas welding and cutting. They increase productive time by relieving operators of time-consuming jobs like changing cylinders, shifting regulators, and similar non-productive tasks. In addition fewer cylinders are required; your inventory is more accurately controlled; cylinder handling and replacement is expedited. A manifolded bank of cylinders, situated away from the work, permits better use of working floor space and also removes a possible operating hazard.

Air Reduction has prepared a booklet describing the installation and operation of manifolds, acetylene generators, and piping systems. This booklet, "Planning Your Oxyacetylene Installation," also contains suggested plans for complete plant piping layouts. For a free copy, write to your nearest Airco office or to Air Reduction, 60 East 42nd Street, New York.

AIR REDUCTION

AIRCO

60 EAST 42nd STREET, NEW YORK, N. Y.

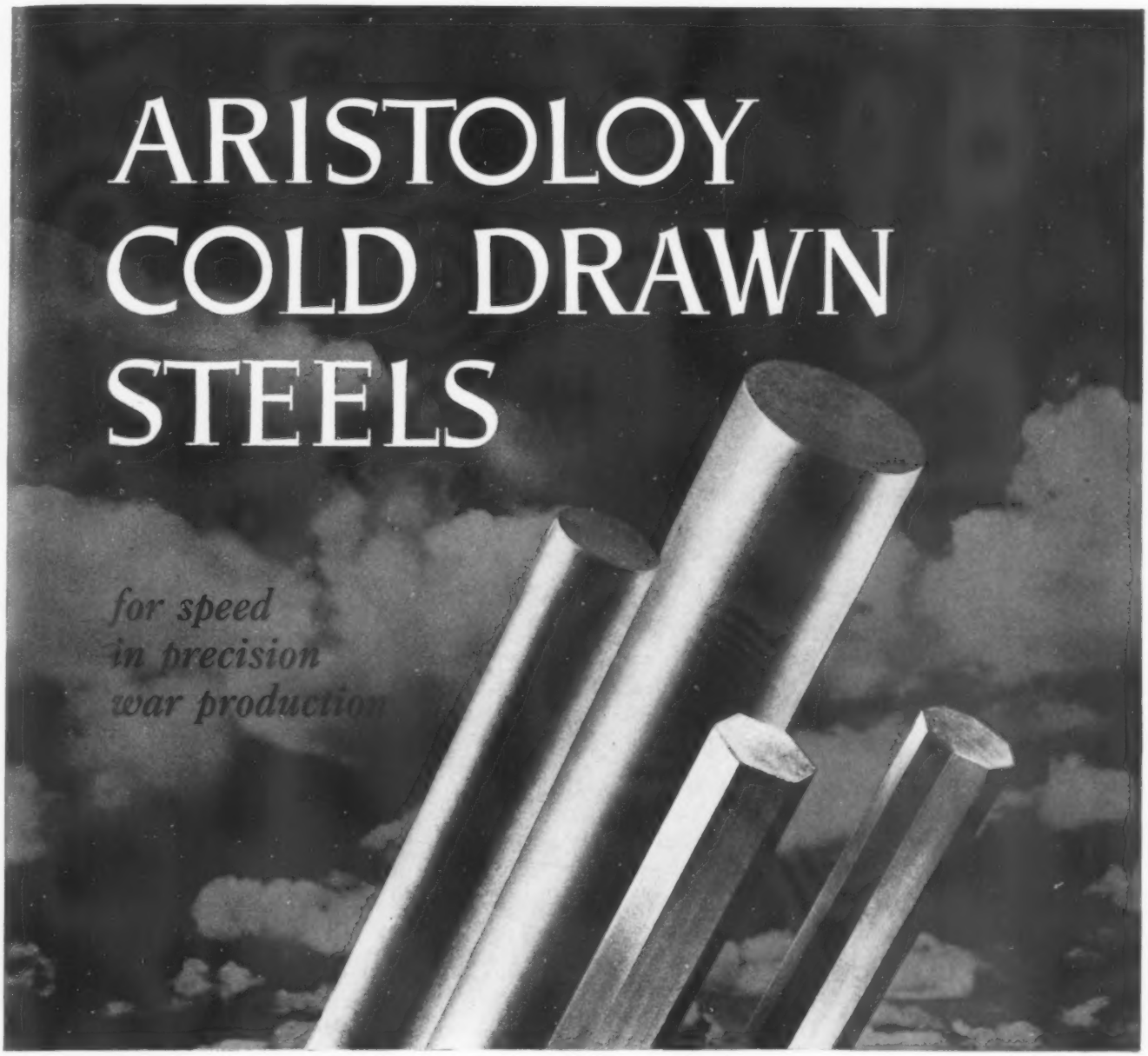
In Texas: Magnolia-Airco Gas Products Co.

"Planning Your Oxyacetylene Installation," prepared by Air Reduction's Applied Engineering Department. Available free on request.

IDLE CYLINDERS ARE PRODUCTION SLACKERS: KEEP 'EM ROLLING FOR VICTORY!

ARISTOLOY COLD DRAWN STEELS

for speed in precision war production



Cold Drawn Steels have the vital wartime job of keeping fast automatic production machines operating continuously at peak loads. The uniform surface and close tolerance of Aristoloy Cold Drawn Steels assure smooth machining with longer tool life and uninterrupted production.

COPPERWELD STEEL COMPANY
WARREN, OHIO

ARISTOLOY STEELS

TO BUILD MORE • • • BETTER • • • FASTER

Carbon Tool Steels • Aircraft Quality Steels • Nitralloy Steels • Alloy Tool Steels • Stainless Steels • Bearing Quality Steels • Cold Drawn Steels

Will Your "FORTRESS" Be Ready On Time?

Think of the months of training and practice this bomber crew put in before they were ready for the real test.

ALTER EGO: And, think of the *years* of effort engineers and shop men put into the development of the "Flying Fortress" . . . all to enable the crew to rule the airways—to navigate in a bee-line to the destination, fight off "competition" all the way, hit the target and get home safely.

Like the YEARS of preparation that'll be required to develop fortresses of knowledge before business crews can expect to rule the post-war market ways.

ALTER EGO: Right! It'll take shrewd management to steer a course of profits . . . ingenious designing to fight off tough competition . . . efficient production to hit the mark of rock-bottom costs and top quality. All of this *to survive.*

All of which is embodied in the practiced use of arc welding. There's our fortress for survival in the Battle for Business. Let's start developing our welding knowledge NOW by consulting Lincoln.

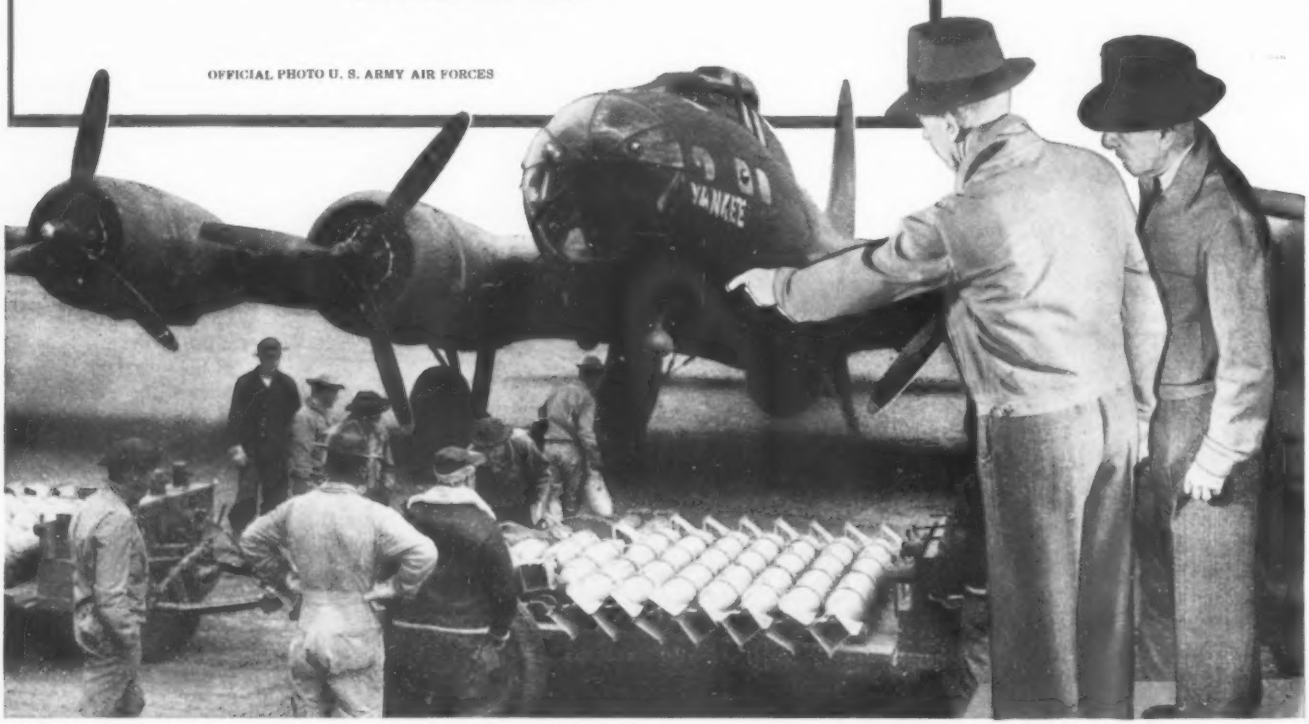
Ask your inner self if time isn't getting short for post-war planning

THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

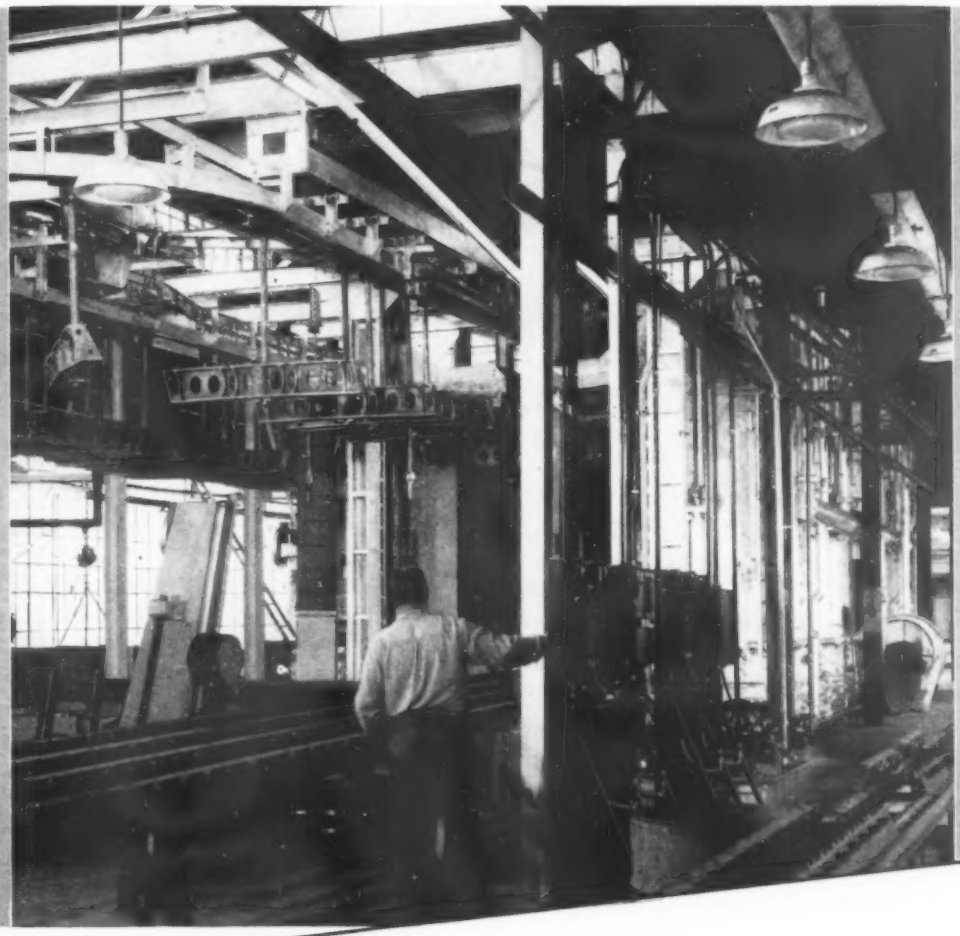
then I said to myself—

WELDED PRODUCTS HIT THE TARGET

OFFICIAL PHOTO U. S. ARMY AIR FORCES



Salem's Ingenuity Applies to Furnaces And Auxiliary Handling Equipment



Example, Bomb Heat Treating and Handling is Now Only a 3 Man Job

● The outstanding performance of Salem furnaces may well be attributed to Salem's experience and knowledge of plant production operations. Salem, therefore, builds and designs furnaces as well as auxiliary handling machinery, which co-ordinates the operations of all equipment to speed production and lower costs. With this thorough understanding of manufacturing procedure, Salem engineers can also offer dependable furnace designs which will dovetail into existing handling mechanisms. The bomb heat treating furnace, pictured above, gives evidence of Salem's complete engineering service. The furnace and quenching equipment, including conveyors, racks, charging and discharging apparatus, are all of Salem design. This war equipment . . . big and important as it is . . . requires only THREE MEN for operating as well as supervision. Write to Salem about your problem—use Salem's experience in war production equipment.

SALEM ENGINEERING COMPANY

SALEM ENGINEERING CO. . . SALEM, OHIO

THE MOST IMPORTANT CONTRIBUTION TO METAL CUTTING SINCE THE ADVENT OF CARBIDE

FULLY PROVEN—EFFECTIVE UP TO CARBIDE CUTTING RANGE—NOT A SUBSTITUTE FOR CARBIDES—USE WHERE YOU CANNOT USE CARBIDES

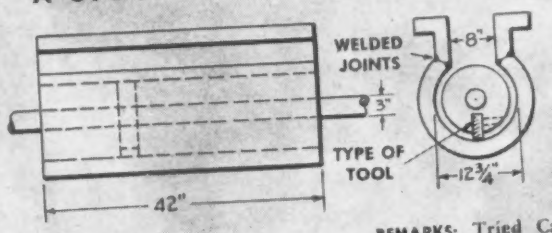
What Is TANTUNG? Tantung is a hard, tough, non-ferrous alloy. Its red hardness is far above that of any steel. It is strong and tough and unlike other non-ferrous cutting alloys, Tantung contains tantalum carbide. This adds materially to hardness and imparts a self-lubricating action which minimizes chip wear or "cratering."

What TANTUNG Does? Tantung cuts rolled, forged or cast steel, cast iron, aluminum, brass, copper, bronze or any material that can be machined.

Increased Machine Productivity! Under most conditions Tantung tools operate at double the speeds recommended for high speed steel. Tantung permits heavier cuts, heavier feeds, more pieces per grind. All these factors contribute to doubling and trebling production on boring, turning, and facing operations.

Change to TANTUNG! It is easy to change to Tantung tools from high speed steel. Standard tools are available which fit most tool posts and holders, and no special grinding equipment and wheels are necessary. The conventional HSS tool practices apply to the effective application of Tantung tools.

A SPECIFIC EXAMPLE OF TANTUNG TOOL PERFORMANCE



SOLID TOOL BIT (⅝" bit in boring head).
MATERIAL—18-8 Stainless Steel and welded joints.
MACHINE—20-year-old Lucas Boring Machine.
ADVANTAGE OF TANTUNG—Unable to keep any other tool from breaking at the welded joint.

	TANTUNG Rough	TANTUNG Finish	OTHER CUTTING MATERIALS
S.F.M.	240	346	All other tools tried failed by breaking at the welded seam after only a few revolutions.
Feed/Rev	14	40	
Depth of cut	⅛	.010	
Pieces per grind	1	1	

REMARKS: Tried Carbides, H.S.S., and a competing cast alloy and got nowhere in a day and a half. Tantung tool bit completed the job in 3 hours, with a mirror-like finish.

FREE—*SEND FOR TANTUNG PERFORMANCE DATA BOOK*

TANTUNG • ECONOMY • ALL PURPOSE • CUTTING OFF • SPECIAL TOOLS • SOLID TOOL BITS • MILLING CUTTER BLADES

VASCOLOY-RAMET CORPORATION

NORTH CHICAGO, ILLINOIS • DISTRICT SALES AND SERVICE IN PRINCIPAL CITIES

IN CANADA: **Carbide Tool & Die Company, Ltd., Hamilton, Ont.**

434

WAR-PRODUCED FOR WAR PRODUCTION

NEW STANICUT OILS

Where STANICUT OILS Are Used

Stanicut 107 BC is designed for high speed automatic work on free cutting steels and can be used on copper and brass, without danger of staining the work. It is also suitable as a coolant where carbide alloy tools are used.

★

Stanicut 62 FC gives considerably better tool life and finish than kerosene and lard oil blends commonly used for machining tough aluminum alloys. It contains no active sulfur and can be used for machining copper and brass. This eliminates changing oil when both aluminum and copper are worked on the same machine. The higher flash point decreases the fire hazard.

★

Stanicut 155 SC is giving excellent results on the tougher alloy steels, especially those that tend to "smear" and leave a poor finish with ordinary cutting oils.

★

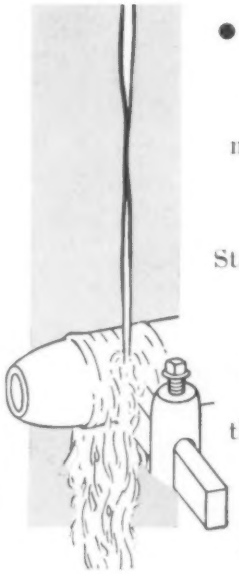
Stanicut 126 BCS was developed for machining 1335 and similar steels lower in machinability rating than free cutting screw stocks, and it gives excellent tool life.

★

Stanicut 309 BCS is designed for heavy broaching, threading and tapping soft steels or those which tend to tear easily. This oil is high in active sulfur, contains compounding, and acts as an anti-flux as well as a coolant.

★

One of these cutting oils can do one or more of your jobs better



● STANICUT OILS are distinctly a war-born development. They are designed to help tools and machines meet the rigid requirements for accuracy and finish at the higher speeds and on the new alloy metals in use today.

Standard Cutting Oil Engineers have spent months in developing, testing and applying them to some of the toughest jobs in war-plant work. If you are still finding it difficult to get the necessary accuracy, finish, and tool life call in one of these cutting oil specialists. See if one of these new oils—and the Engineers' experience in applying them—can help you.

Write Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago, Illinois, for the Engineer nearest you.

2 typical Stanicut applications

Threading M130 Bomb Fuses—Before Stanicut 126 BCS was used in threading WD1314 steel bomb fuses, thread chasers had to be ground every 500 to 1000 pieces. With Stanicut, 6000 pieces are threaded before regrinding the chasers. Thread quality was also improved.

Machining Aluminum Fuse Adapter—On an automatic operation, tough aluminum-alloy parts are formed, drilled, counterbored, chamfered, and cut off at the rate of one each 10 seconds. Even at this high speed, parts run cool with Stanicut No. 62 FC. Finish and tool life are good. Decreased carryaway on parts and chips has reduced oil consumption one-third.

STANDARD OIL COMPANY (INDIANA)

STANICOOL H.D. SOLUBLE OIL

A new type of cutting fluid for the in-between jobs

● On some operations, and with some metals, such as stainless steel, it is difficult to get good tool life and finish with a conventional water emulsion; yet a cutting oil will not supply sufficient cooling to prevent overheating of the work and tool.

Standard Oil Engineers started months ago to work on this problem. Oils were developed and tested on some of the more difficult jobs as they came up in plants converted to war work. Out of this a new type of cutting fluid was developed—STANICOOL HEAVY DUTY SOLUBLE OIL—that has the cooling quality of an emulsified oil, and the ability to give tool life and finish approaching that of a cutting oil.

This oil can't replace all cutting oils, but it may be the solution to some of your troublesome "in-between" machining jobs. Call in a Standard Cutting Oil Specialist and see.

Why experiment with cutting oils? See a Standard Cutting Oil Engineer

You'll save *your* time, machine, and operator time by getting the answer to your metal cutting problems sooner through the help of a Standard Cutting Oil Engineer. These men have been working on problems just like yours since the first plants converted to war production. They've helped in the development of new products and new applications of their old line products for machining the new steels and alloys in use today.

You can also get the help of the Research and Technical Departments of Standard Oil through one of these Engineers. It is not unusual today to find that no available cutting fluid exactly meets the requirements on a machining job. Where you have this problem the Engineer can relay the details of it to his Technical Department. There, special recommendations can be made to meet your need.

Call in a Standard Cutting Oil Engineer. His recommendation may save you many days time experimenting with various mixes and types of cutting fluids.

Keep motors on the job with STANODRIP

Do you have motors in your plant that are always in trouble—bearings over-heating—windings become oil soaked—motors that require constant watching and frequent cleaning?

When spare motors and time were plentiful, you could take these trouble-makers off the job and try to correct their faults. But there's neither time nor motors to spare today. Yet that doesn't mean that you have to nurse these troubles for the duration.

Here's what you do. Where you have a motor that seems to be using a lot of oil, or where oil is creeping along the shaft and getting into the windings, test Stanodrip on it. It's designed for just such hard-to-lubricate jobs. Here's an example:

The motor on the blower pictured above was being oiled twice a week, it required frequent cleaning, and was overheated continuously. After a thorough cleaning, Stanodrip No. 39 was put in the bearings. Now, oil cups are filled once every three or four weeks. Dirty windings are practically eliminated, reducing maintenance cost by about 50% on this motor. Best of all, the operator has quit worrying about failures from overheating.

Have a Standard Lubrication Engineer choose the grade of Stanodrip you need for the job you pick.

HERE'S WHERE YOU'LL FIND A STANDARD OIL ENGINEER

Call any local Standard Oil Company (Indiana) office in the middle western states listed below, or write 910 South Michigan Avenue, Chicago, Illinois. In Nebraska, write Standard Oil Company of Nebraska at Omaha.

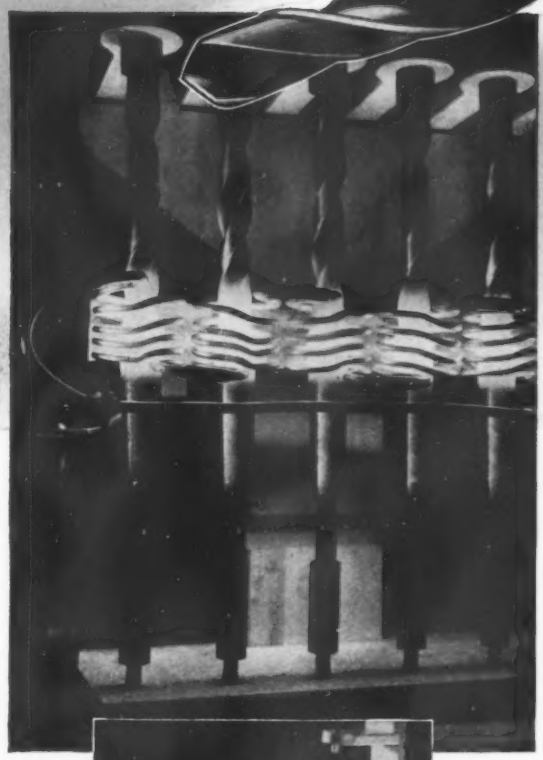
COLORADO • ILLINOIS • INDIANA • IOWA • KANSAS • MICHIGAN
MINNESOTA • MISSOURI • MONTANA • NORTH DAKOTA
SOUTH DAKOTA • WISCONSIN • WYOMING

OIL IS AMMUNITION...USE IT WISELY

STANDARD OIL COMPANY (INDIANA

New Republic Method

FOR MAKING TWIST DRILLS USING



Lepel

HIGH FREQUENCY

INDUCTION HEATING

By replacing conventional welding methods with modern high frequency induction brazing, the Republic Drill & Tool Company, Chicago, Ill., have made an outstanding contribution to the efficient manufacture of twist drills. Photo at left shows the new Republic gang-brazing set-up for joining shanks and high speed drill barrels, on the larger size drills, by LEPEL induction heating. A special high temperature compound is used wherein the brazing action occurs at 1800° F., thus eliminating all danger of separation in high temperature service. This development permits high production machining of the shanks, and heat treatment of the fluted sections, *before* rather than after assembly. The advantages, the economy, the added efficiency . . . all are obvious.

Photos to left show gang-brazing department at Republic, with battery of compact, efficient LEPEL induction heating units; also, female operator quickly brazing a shank to one of the 'long ones' at Republic.

Whether your production problem involves BRAZING, SOLDERING, LOCALIZED HARDENING, ANNEALING, BOMBARDING or MELTING, LEPEL High Frequency Induction Heating in all probability can *greatly expand your output—reduce rejects to a negligible quantity—solve your skilled worker problem*—and *cut costs appreciably.* LEPEL Engineers will gladly and promptly submit facts and figures—based on your own work—if you will acquaint them with your problems. Catalog M gladly sent on request.

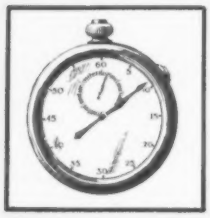
Lepel HIGH FREQUENCY LABORATORIES, INC.

39 West 60th Street, New York, N. Y.

PIONEERS IN INDUCTION HEATING

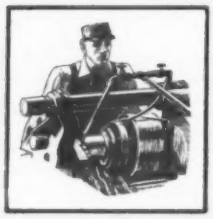
GUN BARRELS

OIL IS AMMUNITION
USE IT WISELY !



FASTER CUTTING

The better cooling and lubricating job performed by Tycol Transparent Sulphurized Cutting Oil is effecting material savings in time and enables greater output even on the toughest of steels.



LONGER TOOL LIFE

Tools that work under Tycol Cutting Oil have a long useful life. Regrindings are cut materially and the problem of chips welding to the tool is minimized.

S BORED 84% FASTER

Production has been stepped up from 68 to 125 inches per hour in the boring of one gun barrel size, since this large producer of ordnance changed to Tycol 655 Sulphurized Cutting Oil. It's being used with tungsten carbide boring tips for the machining of many gun barrels in sizes up to 14". In addition to greater output, this user gets better finishes and more accurate boring because Tycol 655 has *eliminated excessive build up on tool cutting edges* ... there is *no gumming, no rancidity, no tarnishing of machined parts.*

This is but one of the many cutting operations speeded up by modern Tycol Cutting Oils. For engineering assistance to achieve this goal, write to the Tide Water Associated Oil Company, 17 Battery Place, New York, N. Y.

DRUMS! DRUMS! DRUMS!
War needs make it extremely important that all empty drums be returned immediately.

TIDE WATER ASSOCIATED OIL COMPANY

MAKERS OF THE FAMOUS VEEDOL MOTOR OIL

EASTERN DIVISION: 17 BATTERY PLACE, NEW YORK

Principal Branch Offices: Boston, Philadelphia, Pittsburgh, Charlotte, N. C.
TIDE WATER OIL COMPANY OF CANADA, LTD. • Toronto – Montreal

TYCOL

with **TYCOL** *Cutting Oils*

FINER FINISHES
Tide Water Transparent Cutting Oil is unique among sulphur base cutting oils in that it does not tarnish the work. This important consideration led thousands of machine tool users to insist on Tycol.

Are You Having Production Trouble Due To

RUST

on shells and other war supplies?

Rejects...production delays...lowered output...loss of materials, time and manpower are the inevitable result when RUST occurs on work.

You can prevent it . . . avoid it on shells and other war work, as many plants have discovered, by using Oakite materials. Specially designed for production degreasing, cleaning, drawing, cutting, and grinding operations . . . their RUST PREVENTING and retarding properties in most cases, provide the necessary PROTECTION to metal surfaces without need for an extra separate anti-rusting operation.

Let our Technical Service Representative in your locality give you the benefit of his successful experience on rust prevention. There is no obligation. Write, 'phone or wire.

Let Us Help You Get Rid of RUST on:

- Steel Shells
- Steel Torpedo Casings and Parts
- Anti-tank Land Mines
- Machine Gun and Rifle Barrels and Parts
- Depth, Incendiary, Demolition, Practice and other type steel bombs
- Or other munitions and ordnance items you may be making

Manufactured only by

OAKITE PRODUCTS, INC., 24 Thames Street, NEW YORK, N. Y.

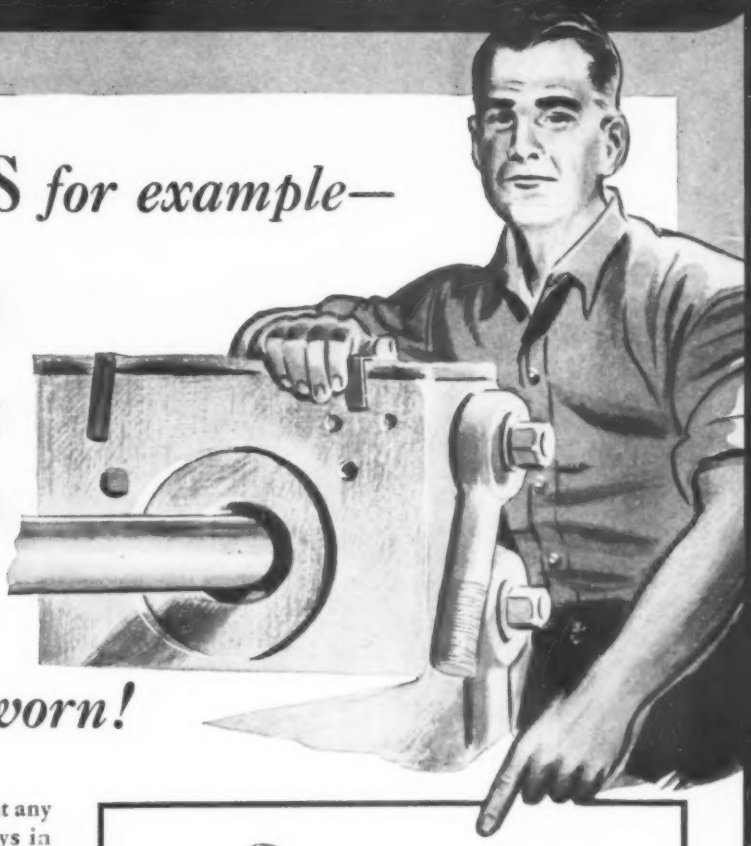
Technical Service Representatives in All Principal Cities of the United States and Canada

OAKITE CLEANING

MATERIALS...METHODS...SERVICE

FOR EVERY CLEANING REQUIREMENT

IS CHROMIUM PLATING YOUR ANSWER TO EXTENDING THE LIFE OF VALUABLE TOOLS AND EQUIPMENT?



MACHINE TOOLS *for example—*

CHROMIUM PLATING

may increase output of your cutting and forming tools . . .

reclaim them when worn!

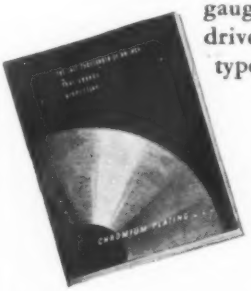
OBTAINING GREATER PRODUCTION per tool without any sacrifice in accuracy . . . meeting quotas despite delays in obtaining new tools and tool steels. These are two problems that chromium plating may be able to solve for you.

By applying a chromium plated surface to many types of cutting and forming tools, greatly increased service life is obtained. In addition, when worn undersize, they can be put back into production again simply by stripping, re-plating and grinding to size.

For example, chromium plated mandrels and dies last many times longer, reduce stoppages and speed output. Chromium plated taps—working in copper, brass, aluminum, nickel, rubber and plastics—often give 3 to 10 times increased production. On broaches and burnishing bars, chromium plating eliminates seizing, produces a finer finish and steps up service life.

FOR MANY OTHER EQUIPMENT PARTS

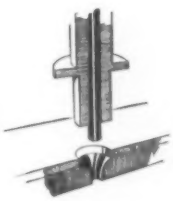
This is just one of countless ways that chromium plating saves valuable materials and man-hours for war production . . . by extending the life of a wide variety of surfaces subject to wear and corrosion . . . by reclaiming many hard-to-replace equipment and production parts which have been worn or machined off-size and would otherwise have to be scrapped. Successful applications of chromium plating for both new equipment and salvage include:—plug and ring gauges, ball and roller bearing parts, piston rods, drive shafts, axles, cylinders, shafts, and many types of spindles, fixtures and jigs.



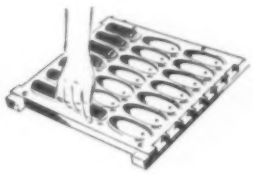
THE BOOKLET SHOWN *will assist you in determining the applications for chromium plating on your products and equipment. A copy of "The Last Thousandth of An Inch That Speeds Production" is yours for the asking. In writing, please mention American Machinist.*

TEN TIMES LONGER LIFE FROM DIES AND MANDRELS

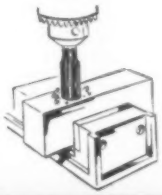
SMOOTHER, FASTER WORK FROM BROACHES AND BURNISHING BARS



WEAR AND ABRASION REDUCED ON FORMING TOOLS



MOLDING DIE LIFE GREATLY INCREASED



INCREASED OUTPUT FROM TAPS, DRILLS AND COUNTER-BORES

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INCORPORATED
51 East 42nd Street, New York, N. Y.
Waterbury, Conn. ☆ Detroit, Mich.

BREAK THROUGH leads to success—*breakdown*, to defeat. To avoid breakdown of *MACHINING* schedules use . . .

. . . SINCLAIR CUTTING OILS AND COOLANTS. These oils are designed to keep tools longer on the job without regrind. They promote clean, cool cutting and high speed machining of all varieties of steels.

Write for "The Service Factor"—a free publication devoted to the solution of lubricating problems.

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE NEAREST SINCLAIR OFFICE

SINCLAIR REFINING COMPANY (Inc.)

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MEEHANITE FOUNDRIES SERVE ALL IMPORTANT PRODUCTION CENTERS

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Meehanite is a unique cast metal in which the better properties of both cast iron and steel are combined. In its 21 distinct types, Meehanite offers such properties as: high strength; resistance to heat, wear, corrosion; exceptional machinability; vibration damping; adaptability to flame hardening and heat treatment; uniform adherence to predetermined properties.

Nation-wide "KNOW HOW" solves your casting problems

No matter where you are, you won't have to go far to get genuine Meehanite castings having engineering properties meeting your specific needs! In all principal manufacturing centers, you will find well-established, modern foundries offering the exclusive advantages of Meehanite Castings.

These selected foundries are members of the Meehanite Research Institute of America, Inc., an organization established to improve foundry practice through scientific research and better manufacturing procedure, and to establish and maintain higher standards of uniform quality and dependability. Through this organization and the headquarters metallurgical staff, cooperative engineering development and research programs far beyond the scope and resources of any private foundry are constantly in progress.

To focus the attention of this broad organization on your individual problems, get in touch with the nearest Meehanite foundry. Through them, the entire engineering and metallurgical resources of the organization are made available to you.

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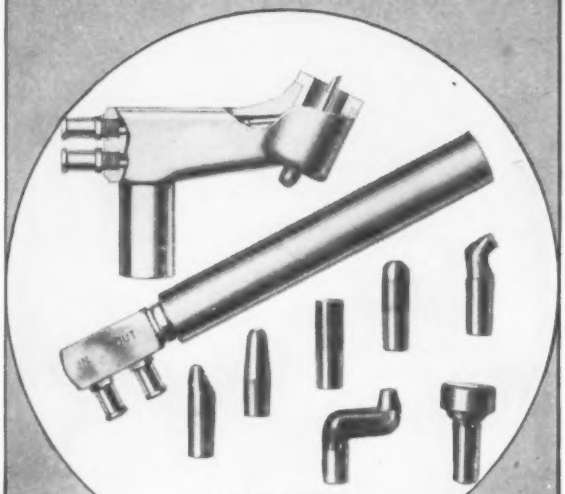
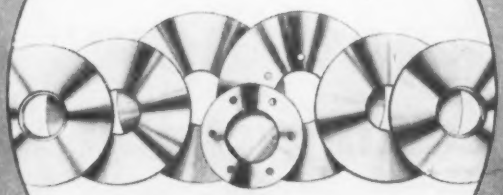
P. R. MALLORY & CO. Inc.

MALLORY

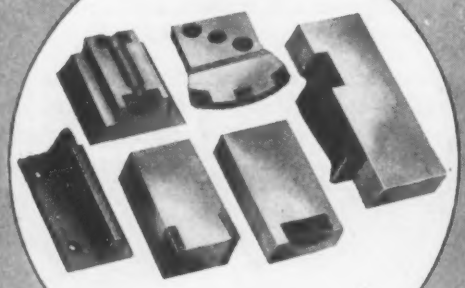
STANDARDIZED RESISTANCE WELDING ELECTRODES



SPOT WELDING TIPS AND HOLDERS



SEAM WELDING ROLLS



FLASH, BUTT, PROJECTION WELDING DIES

Speedier Production
Less Down Time
Better Welding
Lower Cost

How to Dress Spot Welding Tips and Save Vital Raw Material

You'll save production time and conserve essential raw materials . . . do a better resistance welding job, too . . . by insisting that spot welding tips are dressed correctly in your plant. Here are some suggestions:

Three "Do's"

1. Machine Tips to Size on any small lathe having a suitable collet or quick-acting chuck. A day's supply of tips can easily and quickly be machined . . . and machining on a lathe is the best dressing practice.

2. To Dress Tips on the Machine . . . and thus avoid down time on a long production run . . . use the Mallory Tip Dresser illustrated above. This handy tool re-machines both upper and lower tips to the correct welding face, with no need for removing tips from their water-cooled holders. Or, if a flat tip is being used opposite a pointed or domed tip, the latter can be dressed by inserting a plate between the Tip Dresser and the flat tip.

3. Clean the Surface of electrodes at frequent intervals with a fine abrasive cloth. Use this cloth lightly and don't permit it to become contaminated with iron particles or other dirt that may "burn" the electrode.

A "Don't": In general, do *not* use an ordinary shop file to dress spot welding electrodes. Also, a clogged or dirty file will shorten electrode life by contaminating the electrode.

TECHNICAL DATA SPEEDS PRODUCTION! Selection of the best electrode materials, designs and cooling methods for spot, seam, flash or butt or projection welding . . . it's not easy . . . but the right answers in any specific application will certainly speed output. Mallory metallurgists and welding engineers can give you the right answers to your problems on resistance welding. They'll help you produce better welds, faster, at lower cost. Write today for specific data . . . and for your free copy of the useful 79-page MALLORY RESISTANCE WELDING DATA BOOK.

ARMY E NAVY

P. R. MALLORY & CO., Inc., INDIANAPOLIS, INDIANA
Cable Address—PELMALLO

DOW

The winged ingot is a symbol of freedom—graphic expression of Dow's recovery of magnesium, lightest of light metals, from sea water to release airplanes from hampering weight. When peace returns this symbol will reach full significance. Millions of pounds of Dow magnesium—also facilities for fabricating Dowmetal castings and wrought products—will speed transportation and lighten innumerable industrial and domestic tasks.

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

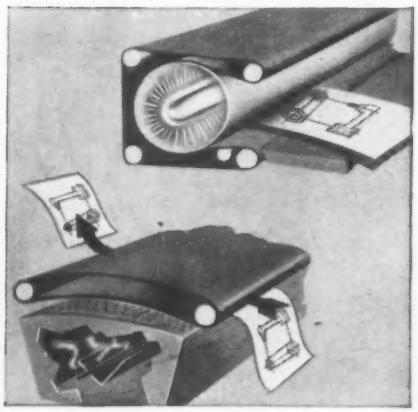
PRODUCER OF THE LIGHTEST OF LIGHT METALS SINCE 1916

MAGNESIUM

INGOT • CASTINGS • FORGINGS • SHEET • STRIP • PLATE • EXTRUSIONS

THINK WHAT OZALID WHITEPRINTS ARE SAVING US

Thousands of manufacturers using the Ozalid Process point to "everyday" savings in time, labor, and materials—savings which are doubly appreciated when you're rushing supplies to our armed forces.



TIME An Ozalid machine turns out whiteprints of engineering drawings, charts, letters, in two quick steps—Exposure and Dry Development. There's no washing, drying, fixing . . . no cumbersome equipment with a hundred "breakdown" possibilities. Ozalid transparent prints—which may be used in place of valuable original tracings—are produced the same way. No "time outs," as in blueprinting, to change solutions...to rethread the machine.

LABOR Any inexperienced person can be quickly taught to operate an Ozalid whiteprint machine at top efficiency . . . there's never a "labor" problem.

And when draftsmen have to make changes in the design of drawings, precious man-hours can be saved because it's never necessary to redraw any part which remains the same as in the original.

MATERIALS Cut sheets as well as roll stock can be accommodated in an Ozalid whiteprint machine. Thus, by using sheets which correspond in size to your originals, you can completely eliminate trimming waste.

Further conservation is possible because no paper is lost pasting up "leaders." Nor are any Ozalid whiteprints unusable due to distortion.

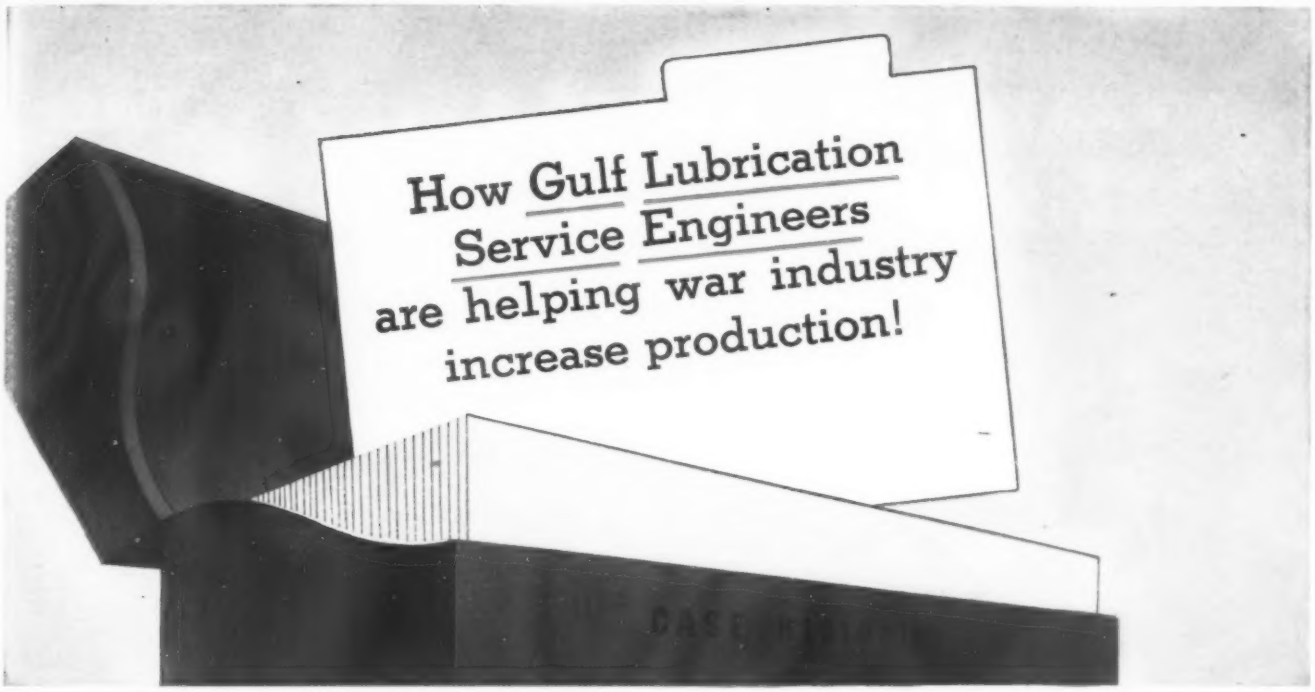
WRITE FOR SIMPLIFIED PRINTMAKING

Our illustrated booklet explains the Ozalid Process and contains samples of Ozalid whiteprints with black, blue, maroon, and sepia lines on white background.

Ozalid Products Division

GENERAL ANILINE & FILM CORPORATION

Johnson City, N. Y.



Bullet Cores . . . by using the cutting oil recommended by a Gulf Lubrication Service Engineer, a manufacturer of 30 cal. bullet cores reduced production time from 10 seconds to 6 seconds per core. Result: a 67% increase in production.

★

Machine Guns . . . heat treatment of the bolt was the bottleneck in machine gun manufacture in a large ordnance plant until Gulf Engineering recommendations were adopted and Gulf Super-Quench was used to quench this part. In order to obtain the required surface hardness of Rockwell C-52, it was formerly necessary to carburize the bolt. With Gulf Super-Quench, this hardness is obtained without carburizing, which means a 50% reduction in heat treating time. In addition, Gulf Super-Quench hardens the bolt through its entire cross section. Result: bolts of better quality, an immediate 100% increase in production of machine guns in this plant.

★

Gyroscope Lever Rings . . . by using Gulf Cut-Aid, as recommended by a Gulf Lubrication Service Engineer, a manufacturer of gyroscopes increased the interval between tool regrinds from 24 hours to 108 hours in the production of aluminum synchronizing lever rings on automatic screw machines. In addition, finish was so greatly improved that a polishing operation was eliminated. Result: a considerable increase in production of these vital parts.

★

Airplane Motor Valve Springs . . . by following the recommendations of a Gulf Lubrication Service Engineer, a manufacturer of valve springs for airplane motors obtained outstanding improvements in production and tool life in machining operations on top and bottom collars. The interval between tool regrinds, for example, was increased from 3 hours to 32 hours.

★

Army and Navy Electrical Connectors . . . a manufacturer of aluminum electrical connectors for Army and Navy equipment increased production 25% and secured better finishes on both turned and threaded surfaces through the proper application of Gulf Cut-Aid, as recommended by a Gulf Lubrication Service Engineer.

★

Explosive Projectiles . . . consulted on the problem of improving cutting efficiency in heavy duty machining operations required to produce 40 mm. explosive type projectiles, a Gulf Lubrication Service Engineer recommended Gulf L. S. Cutting Base B. Result: a substantial increase in production and tool life.

GULF OIL CORPORATION
GULF REFINING COMPANY · Pittsburgh, Pa.

FOR VICTORY BUY UNITED STATES WAR BONDS AND STAMPS

GULF INDUSTRIAL LUBRICATION

Call in a Gulf Lubrication Service Engineer to help step up your production

McKAY ELECTRODES SPEED VITAL "AIRPORTS OF THE SEA"

U. S. NAVY OFFICIAL PHOTOGRAPH

Like homing pigeons to their cote, our war-birds swoop back from their objectives to the welcoming flight deck of their "sea-nest" carriers.

That more, and yet more, of these brood ships may be launched to swell our increasing sea-air power, McKAY Shielded-Arc Welding Electrodes are shipped in ever-growing quantities for this vital marine use.

The McKay Company is proud that Electrodes from its "researched line" are speeding the production of these and other weapons of Freedom. Looking confidently forward, the welding skills achieved in the crucible of War may, one day, help to win the Peace.

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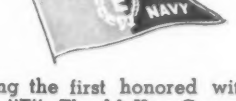
The McKay line includes regular carbon steel, stainless, and alloy steel electrodes for every welding purpose. Literature on request.



Among the first honored with the Navy "E", The McKay Company is proud of the broader award of the Army-Navy "E".

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McKAY WELDING ELECTRODES

AND INDUSTRIAL, MARINE AND AUTOMOTIVE CHAINS

Increased SURFACE SPEEDS • *Better* FINISH • *Lower* TEMPERATURES

A Typical Example of Production Improvement with

EN-AR-CO PROMAX CUTTING OILS

• For over 60 years The National Refining Company has pioneered in the development of Industrial Lubricants. Our engineers will work with you in maintaining your plant and equipment at its wartime best.

• One large industrial user, reporting on the hobbing of S.A.E. 4620 gears, writes: • "Since changing to Promax Cutting Oil on our Barber-Colmans, we have been able to increase surface speeds from 70 to 110 feet per minute. We get better finish on gears and the temperature of finished pieces has been lowered to a point where the girls can remove them without wearing gloves." • Metal workers are learning the importance of correct cutting oils for specific jobs. Many plants have increased production 50 per cent to 75 per cent by the simple process of changing to PROMAX cutting oils. • *Write today for information on the PROMAX Cutting Oils best fitted to your specific production needs.*

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KEEP WHEELS TURNING *FASTER···LONGER*

Wartime production demands full efficiency in every motive unit. This calls for the best in bearing bronze. To gain the longest bearing life . . . to cut replacements to a minimum...to keep wheels turning FASTER...LONGER—install Johnson UNIVERSAL Bronze. Your local distributor has a stock on hand.

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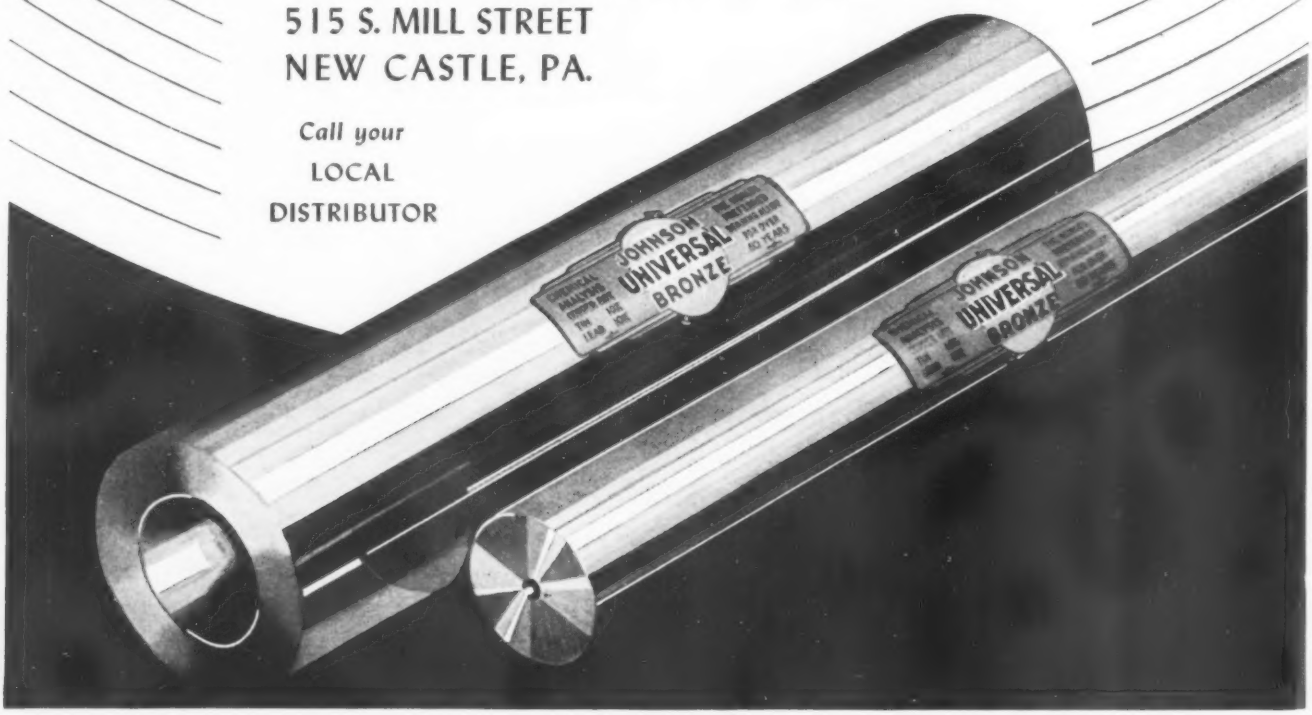
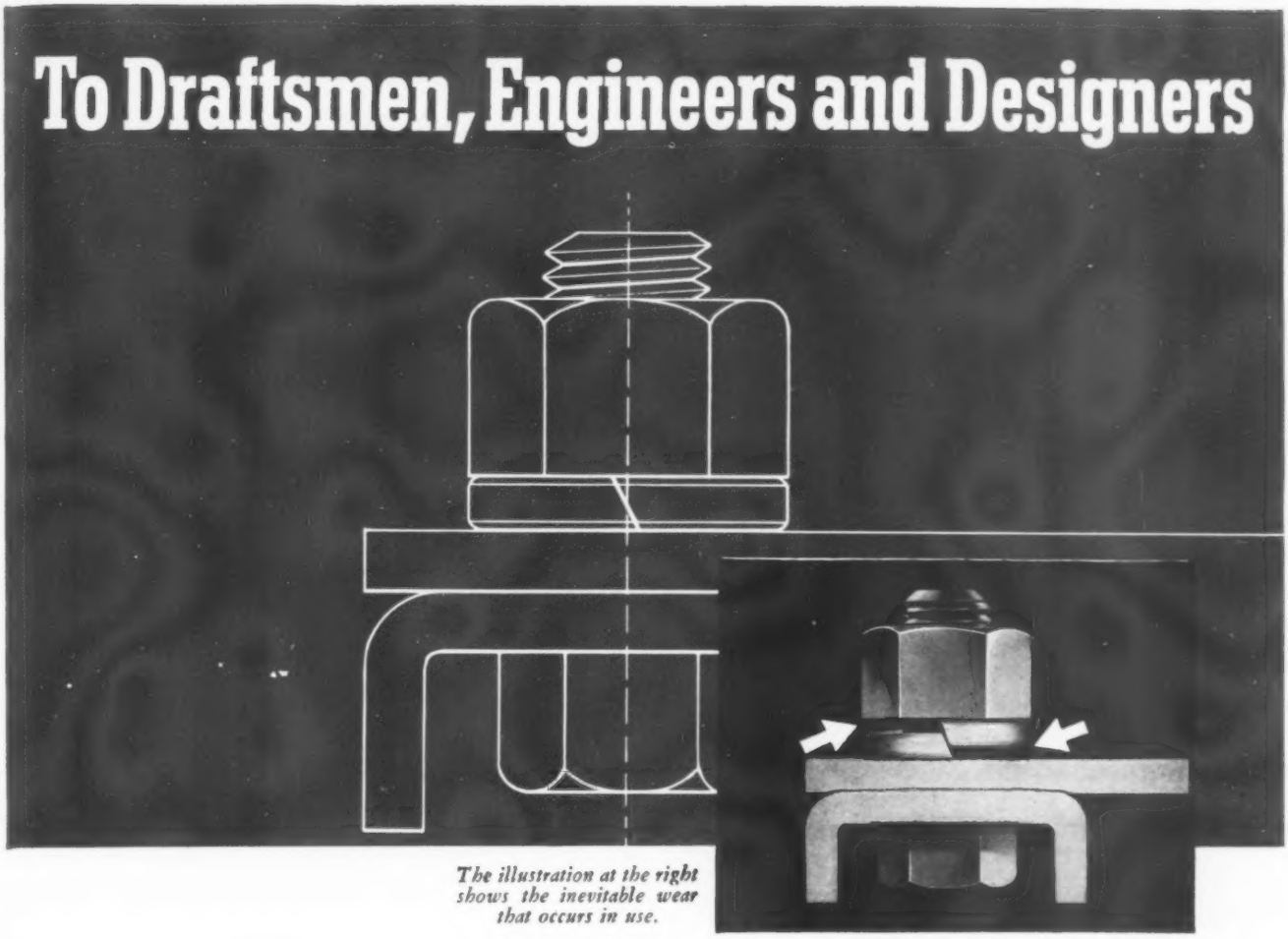


To Draftsmen, Engineers and Designers



The illustration at the right shows the inevitable wear that occurs in use.

In war time fundamentals are important, this is a fundamental

Many devices can lock a nut on a bolt so that the nut **cannot** turn. But that alone is not sufficient.

Many constructions – so bolted – will loosen because of bolt stretch, and the frictional wear of metal on metal, burrs, flares, and the pulverizing of paint, scale and rust.

Since the advent of the castellated nut, research has found that looseness is usually caused by ductility, and wear at every contact point of metal surfaces.

From an engineering point of view, nut **locking** devices – although they may keep the nut from turning – do not and cannot give the necessary spring reaction that keeps bolted assemblies tight. **Vibration** and **stress loosen everything** – they always have and always will.

You **must** use a spring which expands as wear occurs. Expanding **spring** power retards initial wear, then compensates for later wear, and **holds parts tight** for a **long period** of time. **A strong spring does it – nothing else can.**

So **with** or **without** a nut locking device specify spring washers on every bolted construction you design.

The **live spring** gives you safety, economy, and efficiency.

Kantlink spring washers are strong, non-tangling, helical springs with wide and ample reactive power – (spring expansion).

There is no substitute as economical. No fixed nut nor any short range multi-toothed washer can possibly equal the great holding power of a **long range live spring** – a big helical spring such as Kantlink.

Write today for a descriptive folder.

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TRADE MARK

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the long-range Spring Washer

DIAMOND•TOOLS

contain a number of small, whole diamonds which may be completely consumed without resetting. While they are mainly intended for finish grinding, they may be used on wheels of any size and hardness. Catalog on request.

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SECOMET Resinoid Bonded Diamond Wheels can do your work more accurately, faster and without appreciable wear. They are most economical for sharpening cemented carbide and multi-bladed tools, such as milling cutters, broaches, etc. Moreover, their sharp, free-cutting action eliminates lapping and the usual semi-finish grinding operation. Catalog on request.

Prompt deliveries

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COMBINATION DRILL AND TAP GRINDERS

Model 10-B

Sharpens Taps, 2, 3 and 4 Flute, Right or Left Hand. Sizes #6 to one and one half inches.

Sharpens Drills, 2 and 3 Flute, Straight or Taper Shank. Sizes from one eighth to one and one half inches.

"Sharp Drills and Taps
Cut Holes in Rising
Production Costs."

Other Combinations Also Available

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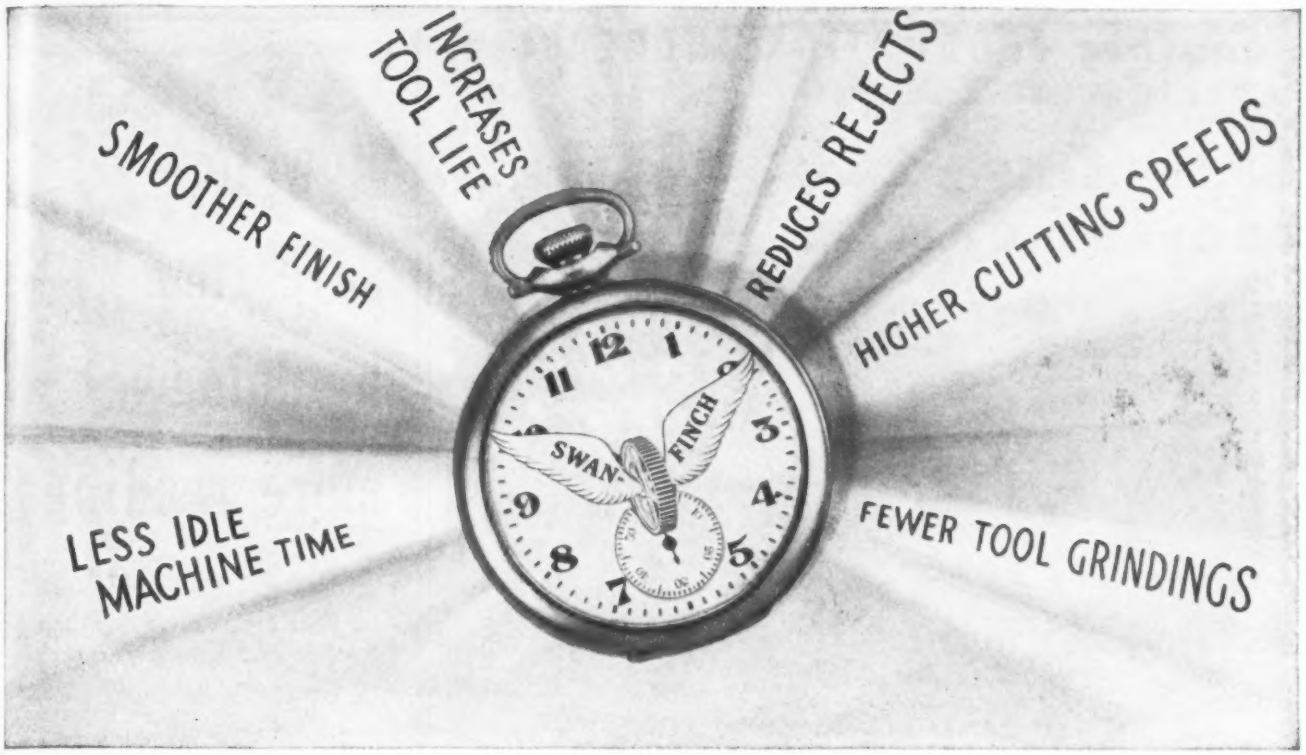

SAFCO METAL WORKING LUBRICANTS

are proved time-savers!

Over and over again it is being proved on the job that 'SAFCO' lubricants are time-savers — — — increasers of production.

Hundreds of reports from highly engineered plants, (many outstanding leaders in vital war production), *prove* that 'SAFCO' can bring amazing increases in production.

For over 40 years, SWAN-FINCH, makers of 'SAFCO' products, have been leaders in the highly specialized field of Metal Working Lubricants.

Today as never before our specialized experience is proving its value in helping machine shops meet new and exacting production requirements.

It will pay you real dividends to get better acquainted with the Swan-Finch field representative who covers your district. Capable and able, they are constantly devising *new* ways and means for stepping up production.

For instance meet William K. Shanning. He is one of our highly trained and experienced staff of fieldmen.

ASK US TO HAVE HIM CALL—NO OBLIGATION.

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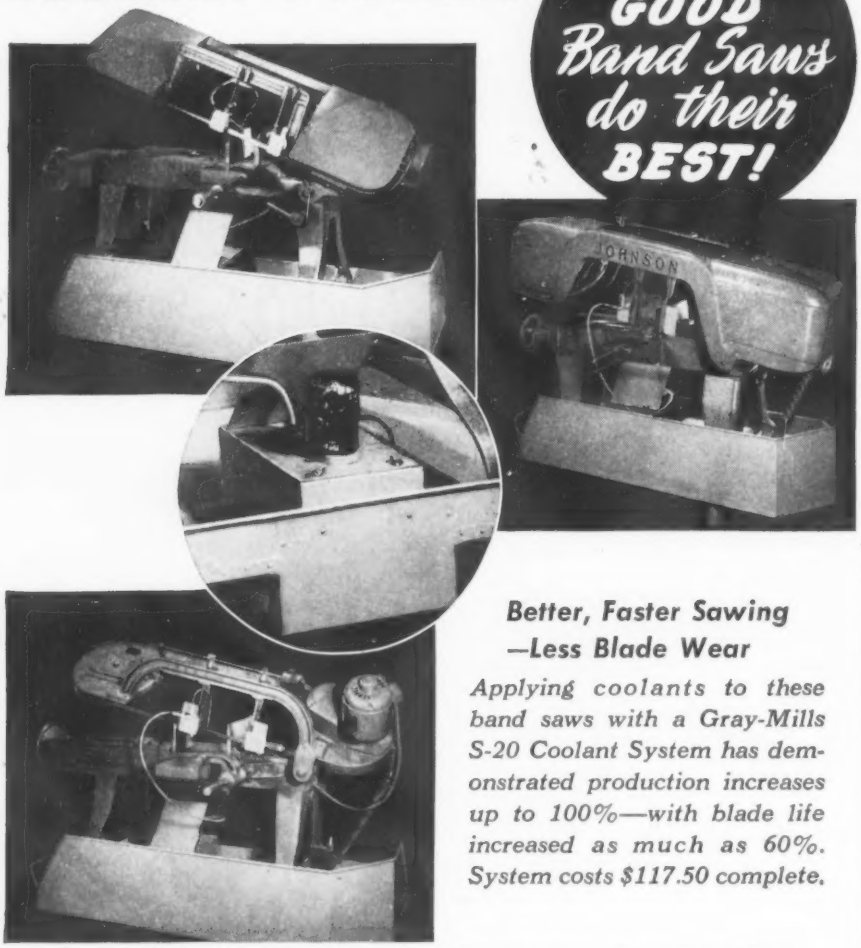
Another PRODUCTION INCREASING APPLICATION . . .

Gray-Mills *Portable* COOLANT SYSTEMS

Help GOOD *Band Saws do their* BEST!



Better, Faster Sawing —Less Blade Wear

Applying coolants to these band saws with a Gray-Mills S-20 Coolant System has demonstrated production increases up to 100%—with blade life increased as much as 60%. System costs $117.50 complete.

Save Time and Tools — Increase Production

by adapting your machines for coolant cutting. You can, quickly, easily and economically with Gray-Mills Portable Coolant Systems. For instance; the three metal cutting band saws, above, were equipped for using the advantages of coolants by attaching a simple coolant return pan upon which is mounted a Gray-Mills pump unit.

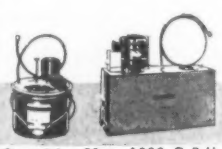
All types of machine tools for drilling, tapping, cutting, milling, honing, belt grinding, sawing, etc. are working faster and better with coolants applied by Gray-Mills Coolant Systems.

If you want to modernize older machines — equip small, large or special tools for greater efficiency—or have a standby system for emergency—Gray-Mills Coolant Systems are the answer. They are available in the gear pump type with capacities up to 165-gal. per hour or the centrifugal type with controlled flow from 1 to 1000-gal. per hour. Prices range from $39.50 to $132.50. Call your distributor for complete details or write direct. GRAY-MILLS CO., 227 W. Ontario St., Chicago, Ill.

GRAY-MILLS

Gray-Mills Flo-Bac No. 5 Saw-Kut is a special coolant blended specifically for metal sawing work. It assures top cutting efficiency when used in Gray-Mills Coolant Systems.

COMPLETE PORTABLE COOLANT SYSTEMS



Capacities 50 to 1000 G.P.H.
Pressures 8 to 150 lbs.

How to save time by doing more reading

That is a profitable paradox for you. More true today than perhaps ever before. For here in the pages of this publication are packed many helpful ideas . . . considerable useful information. Much of it, in fact, available from no other source.

And we most emphatically mean *both* the editorial and the advertising pages.

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Good advertising speeds information from those who have it . . . to those who need it.

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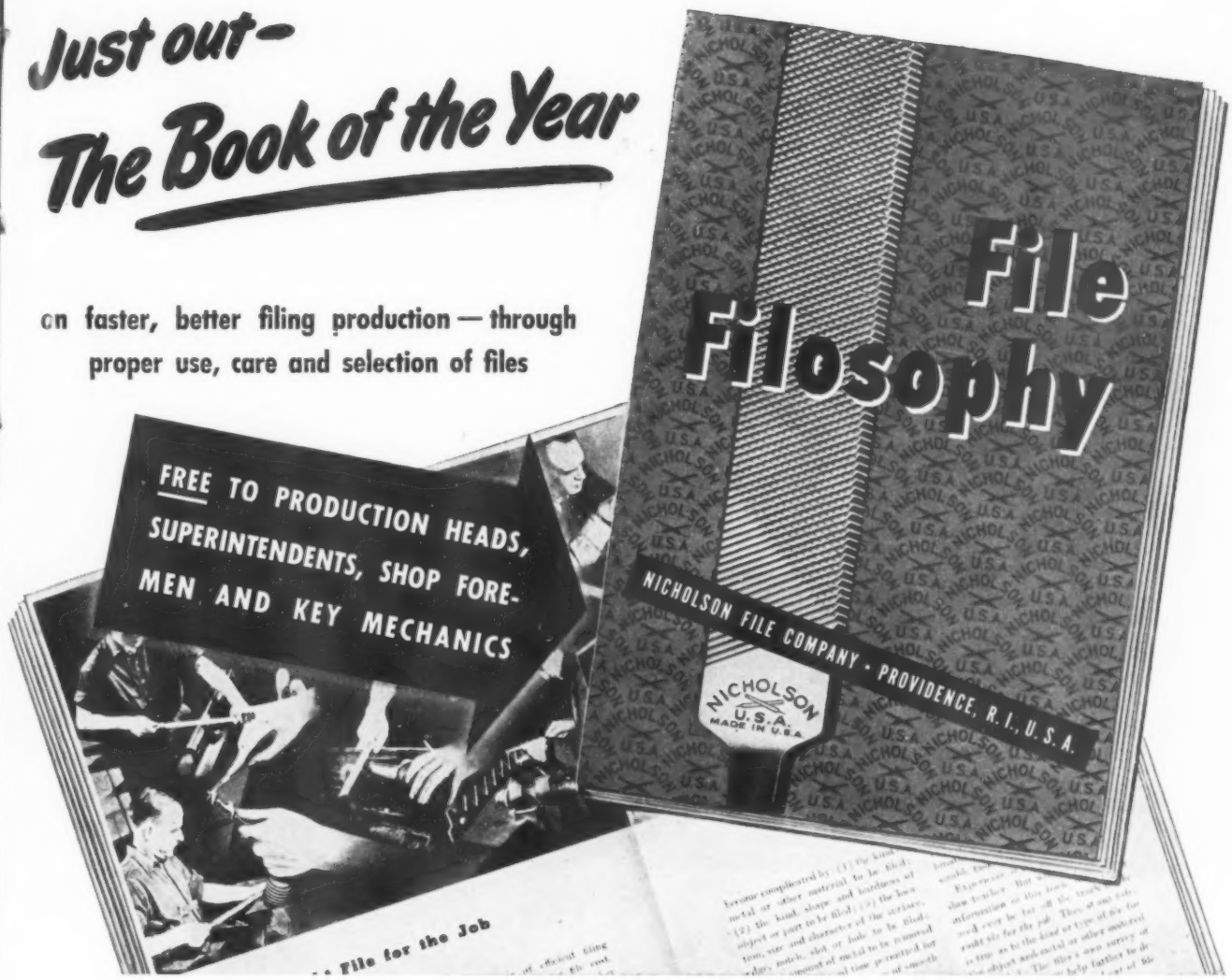
on faster, better filing production — through proper use, care and selection of files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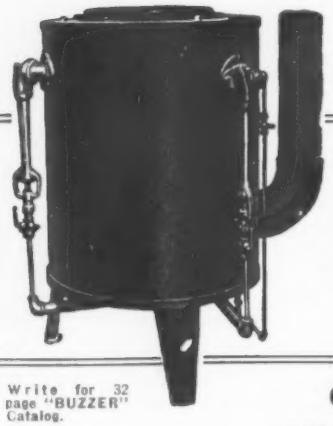

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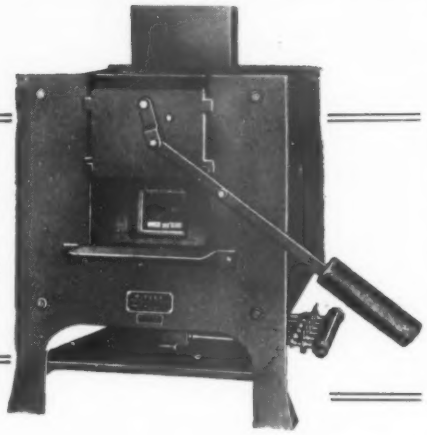

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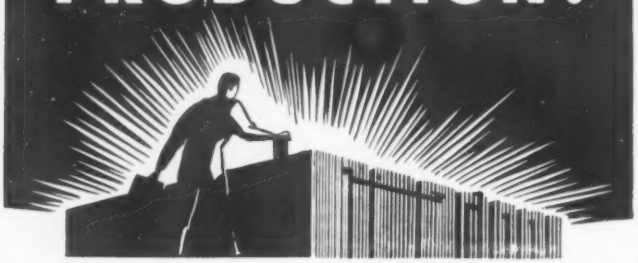

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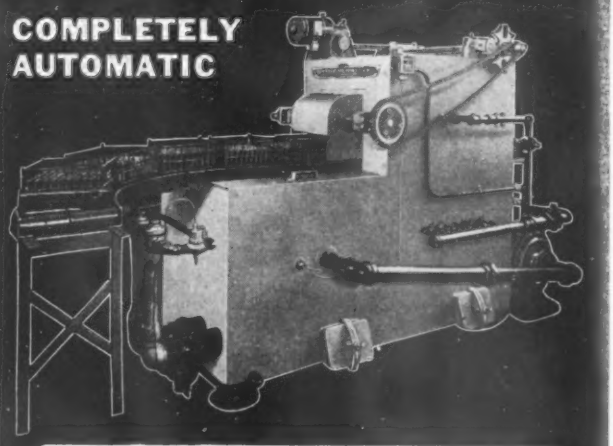

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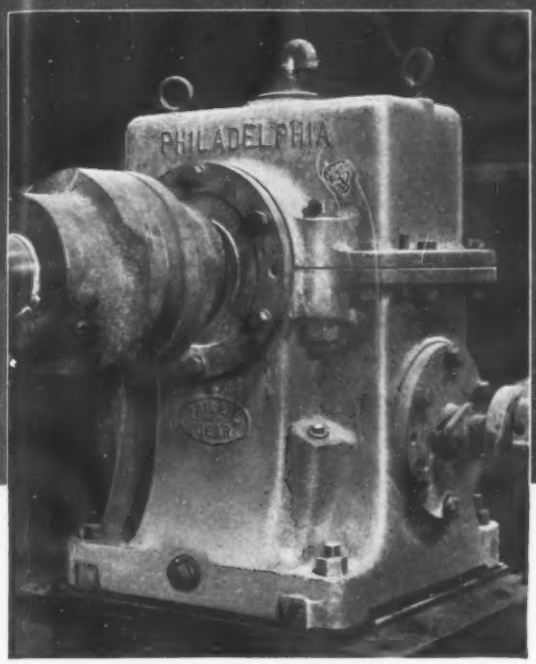

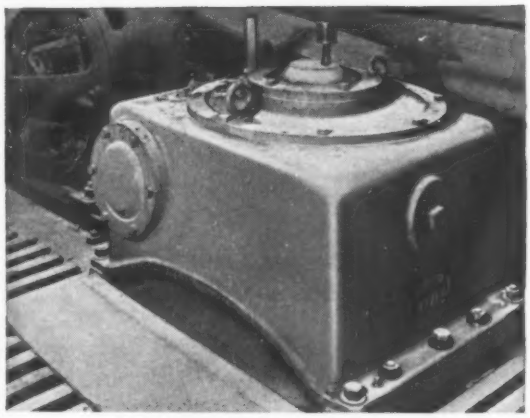

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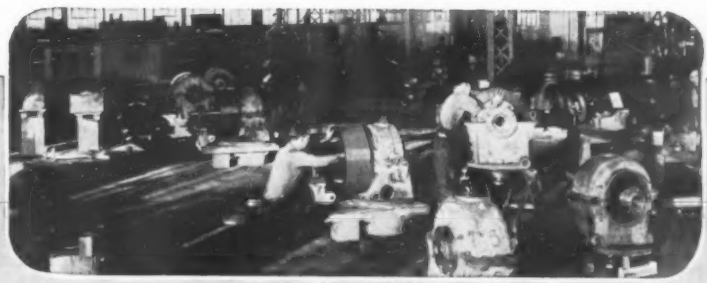

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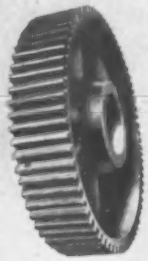

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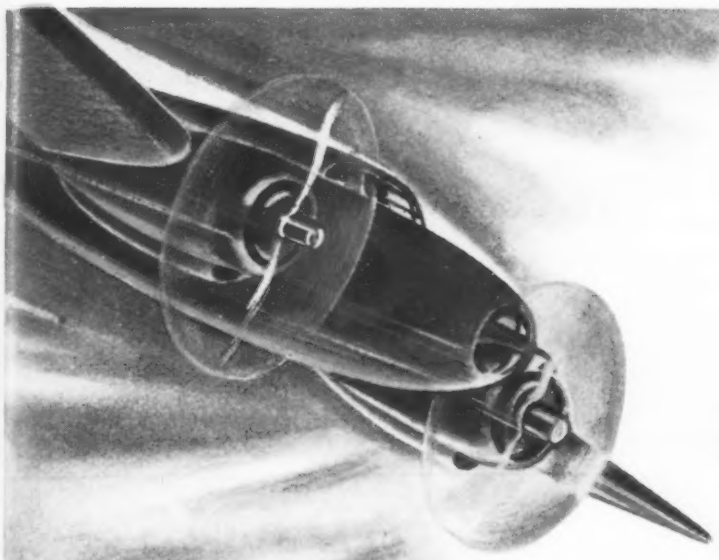

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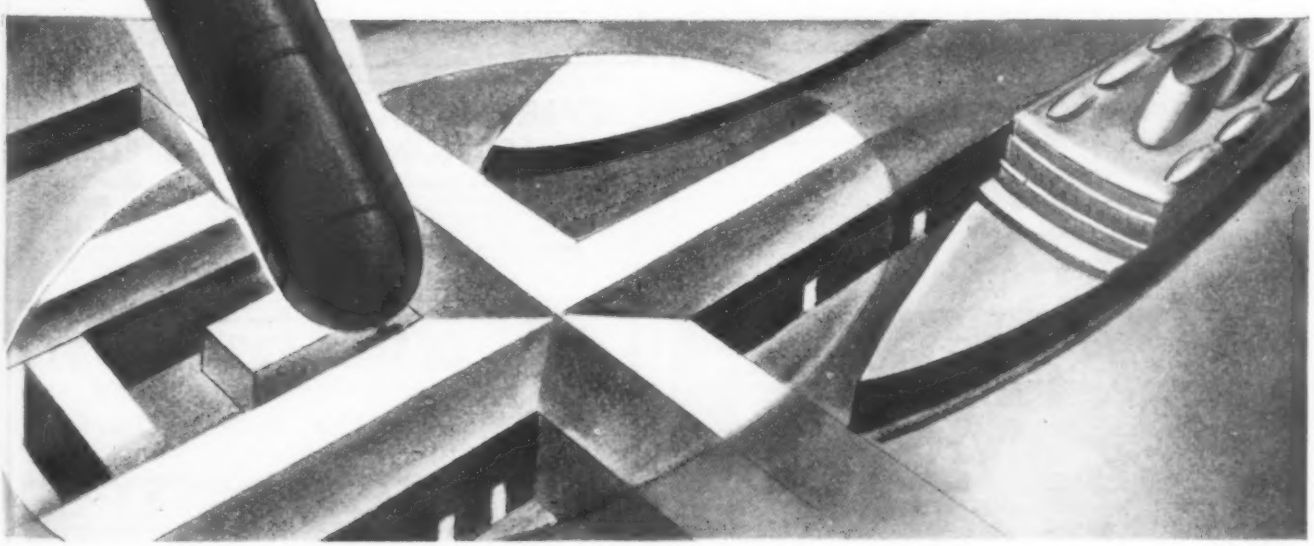

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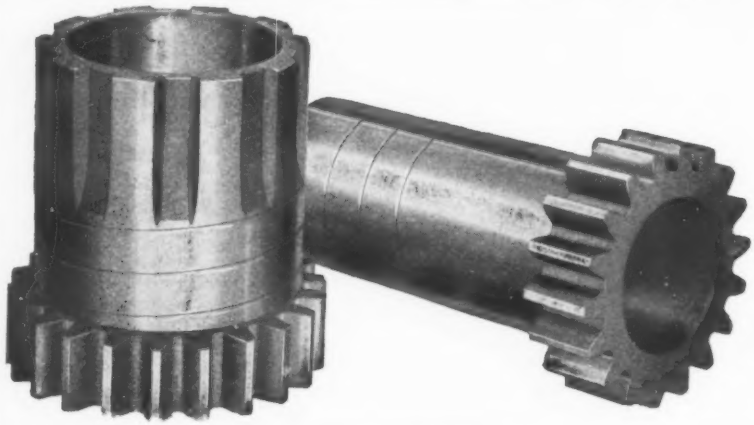

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EVERY-ISSUE "WHERE-TO-BUY" SECTION DISCONTINUED

This step is necessary to conserve paper, in compliance with WPB's restriction. Still available, however, is *American Machinist's* enlarged "Where-To-Buy" Directory, as published in the Jan. 21, 1943, "Annual." Reprints of this Metal-Working reference source may be obtained at no charge by writing READER SERVICE DEPT., AMERICAN MACHINIST, 330 W. 42 St., NEW YORK, N. Y.

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STANDARD TYPE **STANDARD TYPE**

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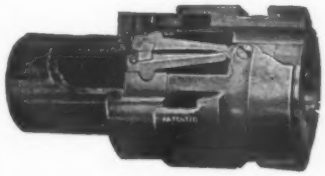
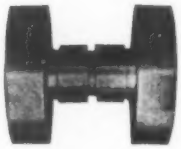
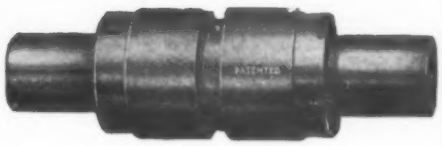


Single Clutch—Showing Working Parts

Single Clutch with Pulley



Double Clutch with Pulleys



Double Clutch—Exterior

Single type is for driving forward. Double type is for forward and reverse, or for two-speed drive. They are ideal for line shaft or countershaft installations, in machine shops, mills or factories. See illustrations below.

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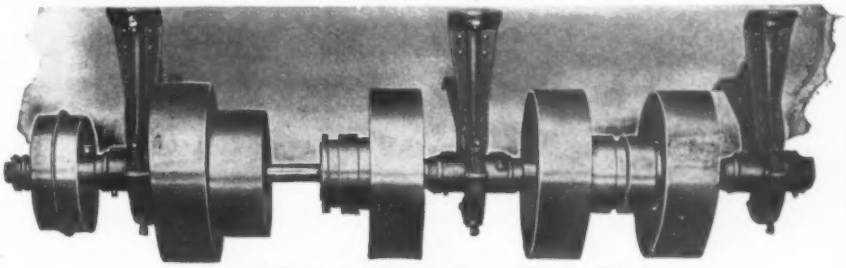
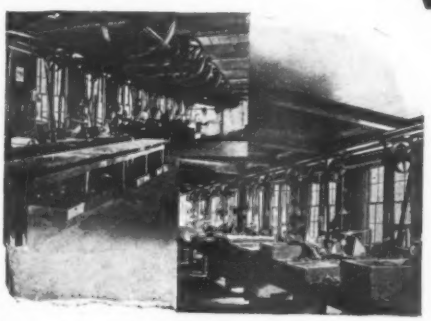


Countershaft Equipped with Three Johnson Clutches

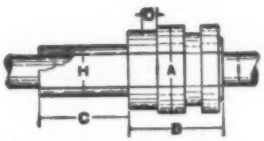
The Old Way



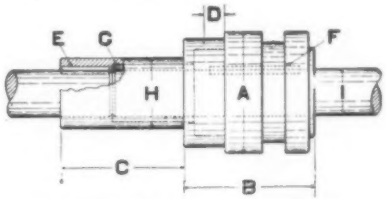
Lineshaft Drive *The New Way*

Johnson Friction Clutches are extremely well adapted to countershaft use. Light in weight, compact, and nicely balanced, they provide a countershaft that operates smoothly, consumes little power, and gives long and continuous service. The illustration above shows three Johnson Clutches mounted with standard pulleys to give two forward speeds, a reverse, and an auxiliary drive.

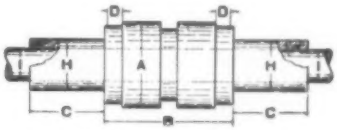
Thousands have been used during the past 30 years as a part of all kinds of machinery, incorporated as a part of the machine.



Single Clutch—Pulley Type



Single Cut Off Coupling Clutch



Double Clutch—Pulley Type

DIMENSIONS OF STANDARD SINGLE AND DOUBLE CLUTCHES

Clutch Size No.	†Clutch Ft. Lbs. Torque Slips At	DIMENSIONS, INCHES I Max. Bore	I Min. Bore	A Max. Diam.	B-Length Clutch Proper Incl. Cups Single	B-Length Clutch Proper Incl. Cups Double	C—Std. Clutch Hub Length	D Throw to Engage Clutch	Weight, Lbs. Single	Weight, Lbs. Double
*00	60	1/2	1/4	2 1/2	2 1/4	3 1/2	1 1/2	3/4	2 1/2	3 1/2
0	150	1 1/4	1/2	3 1/2	3 1/4	5	3	7/8	10	20
2	270	1 1/2	1	4 1/8	4 1/2	6 3/4	4	1	12	25
4	320	1 1/2	1 1/8	4 5/8	5 1/4	7 1/2	5 1/2	1 1/8	19	32
5	415	1 1/2	1 1/8	5 1/8	5 1/4	8 1/4	6	1 1/8	27	43
6	600	2 1/2	1 1/2	5 1/8	6 1/4	8 5/8	6 1/2	1 1/8	35	54
8OS	855	2 1/2	1 1/2	6 1/2	6 1/2	11 1/4	8 1/2	1 1/2	53	96
8NS	855	2 1/2	1 1/2	6 1/2	5 1/8	8 1/8	6 1/2	1 1/2	38	63
10OS	950	2 1/2	1 1/2	7 5/8	5 1/2	8 1/2	8 1/2	1 1/2	75	110
10NS	950	2 1/2	1 1/2	7 5/8	5 1/8	8 1/8	6 1/2	1 1/2	75	110
11	1305	3 1/8	1 1/2	9 1/8	6 1/4	10 1/8	8 1/2	1 1/8	130	150
13	1500	3 1/2	2 1/8	11 3/4	8 1/8	11 7/8	10	1 1/4	190	280

* Midget type for fractional hp.: made differently from standard type.

† Clutch frictions will slip when load equals the torque noted in this column. Select a size of clutch that has a good factor of safety, of clutch torque, over the foot pounds torque of problem.

OS.— Old Style; exceptionally long in No. 8 size; with light clutch levers in No. 10 size.

NS.— New Style; compact, with heavy clutch levers.

BORES.— Decimal, millimeter or above maximum or below minimum in table, Columns I, command a special price.

CLUTCH HUB LENGTHS.— Column C if different than standard, command a special price.

CLUTCH HUB DIAMETERS.— If different than standard, command a special price.

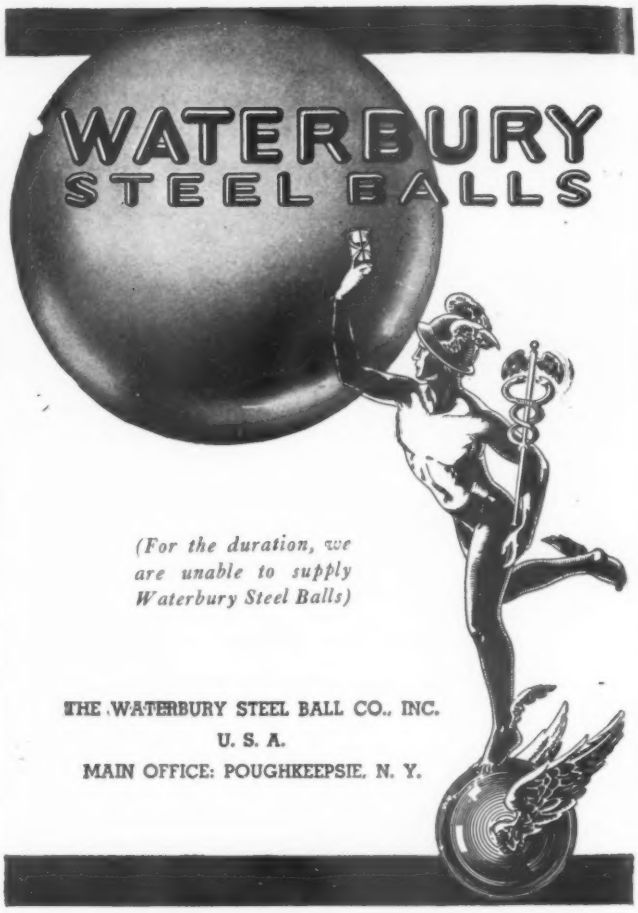
Bores of all hubs Alemite lubricated if possible with excess lubricant led to clutch frictions. Clutch hub ordinarily 1 inch longer than face of pulley used.

Diameter of hub H must be approximately 1 inch larger than shaft diameter. If a bushing of any kind is used in the hub bore, it must be made proportionately larger. The hub length C can be furnished any dimension on special order. Clutches with bushed hubs considered special.

Diameter of standard and bushed clutch hubs ordinarily made to fit standard pulley bores as far as possible.

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN

BEVEL GEARS...
Earle Bevel and Miter Gears and Pinions are made with either planed or generated teeth, of any gear material, in sizes from ½" to 13 feet in diameter. Accuracy and finish are such as to insure smooth, efficient operation and long life.
In addition to bevel gears, Earle manufactures a full range of gear types and sizes—in practically every gear material. Send for the Earle Gear booklet 42-G which contains full detailed information.
THE EARLE GEAR & MACHINE CO.
4723 Stenton Ave., Philadelphia, Pa.
EARLE GEARS


WATERBURY
STEEL BALLS
(For the duration, we are unable to supply Waterbury Steel Balls)
THE WATERBURY STEEL BALL CO., INC.
U. S. A.
MAIN OFFICE: POUGHKEEPSIE, N. Y.

"When your specifications call for special gears — Spur — Bevel — Mitres — Helical — Worms and Worm Gears — Reduction Units — Why not try GRANT.
You will find GRANT service meeting all requirements on both stock and special gears."
GRANT GEAR WORKS
BOSTON

GANSCHOW GEARS
FOR SIXTY YEARS
Spur – SPEED REDUCERS – Worm
ALL TYPES OF CUT GEARS
GANSCHOW GEAR CO., 18 N. Morgan St., Chicago

Facilities available for immediate production
BRAWNY GEARS
of fine pitch spur or internal gears, under 3" diameter. Fully machined blanks must be supplied by customer. Submit prints for prompt estimate.
BRAUN GEAR CO.
1590-1608 Atlantic Ave., Brooklyn, N. Y.

---a "DEGREE" in gear perfection

"Gears by Meisel" . . . These two letters signify thirty-three years of specialization in the art of gear design. They symbolize the *construction of gears for specific purposes* which, by their inherent accuracy, assure the highest possible degree of mechanical perfection. Lay your problem before a MEISEL Gearist to determine the *one* gear suited for your job.

An interesting brochure, entitled "Gear Craftsmanship," will be mailed FREE upon request.

MEISEL PRESS MFG. CO.
946 Dorchester Ave., Boston, Mass.

"On a Large Class of Machine Tools, in Order to Procure Maximum Production, Individual Motor Drive is Essential."

HERE'S WHAT THE EXPERTS SAY →

HERE'S THE DRIVE-ALL UNIT . . . →

CHECK THESE DRIVE-ALL APPLICATIONS →

"INDIVIDUAL MOTOR DRIVE—It is now generally agreed among manufacturers that individual motor drive for machine tools is much superior to group drive. The principal reasons are that greater flexibility may be obtained, belt troubles may be almost completely eliminated, better lighting conditions prevail as all overhead transmissions are unnecessary, speed controls for individual machines may be regulated to a nicer degree, interruptions are fewer as the shutting down of a motor affects only a particular machine, and transmission and friction power losses are greatly reduced. In fact, on a large class of machine tools, in order to procure maximum production, individual motor drive is essential."

MACHINERY'S HANDBOOK,
Eleventh Edition, Page 1648

There are standard Drive-All selective speed motorizing units for application on all belt-driven machines. 1 to 10 H.P. in either 3- or 4-speed models. Can be mounted on an average machine in about two hours' time. All models also available with clutch and with right or left hand output. Variety of standard mounting brackets save installation time and provide simple belt adjustments.

☐ LATHES AND TURRET LATHES

☐ DRILL PRESSES AND RADIALS

☐ TAPPERS

☐ MILLING MACHINES

☐ AUTOMATICS

☐ BORING MILLS

☐ GEAR CUTTERS

☐ SHAPERS AND PLANERS

☐ SPECIAL APPLICATIONS

Drive-All Technical Service Offices in Detroit—Milwaukee — Chicago — Boston — Cleveland — Buffalo — Kansas City
Also Dealers in Principal Cities

DRIVE-ALL MANUFACTURING COMPANY

3400 CONNER AVENUE
DETROIT, MICHIGAN

. . . TIRED - but NOT "EXHAUSTED"

No red leather—no chrome trim—they're built for business—these landing barges of our armed forces.

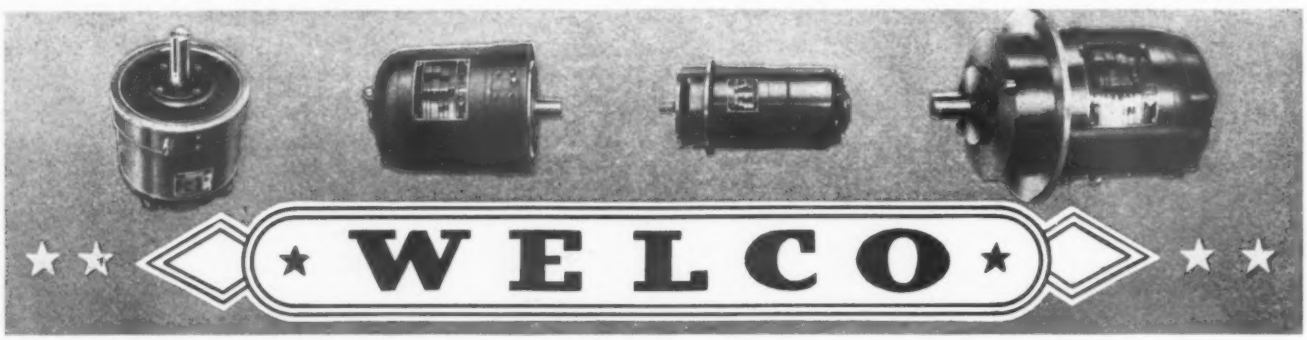
But the lounge of a luxury liner has never supplied purer air than that breathed by our boys crowded around the fuming diesel engines of these small craft.

Ventilation must be sure. Not for comfort, but for life itself. When it was decided that no ordinary motor could be depended upon to power the vital exhaust fans necessary, WELCO was called on to build the special water-proof, drip-proof motors that would not fail.

In war or peace, when a *special* motor is needed, look to WELCO.

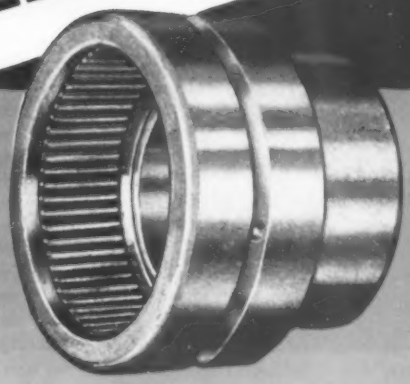
THE B. A. WESCHE ELECTRIC CO.

1626 Vine St. **Cincinnati, Ohio**



The Hardest Working Bearing in all Bodine machines is an . . .

ORANGE ROLLER BUSHING



THE basic advantages of Orange Roller Bushing design have been adapted with great success to many exacting and punishing applications, by Orange engineers. In the majority of cases, standard bushings from stock have provided the answer. In others, such as the above, special adaptations have been designed to meet unusual requirements.

Chief advantage of Orange Roller Bushings, is the closer running clearances, achieved by holding roller clearances to a minimum through a rigid standardization of size. This prevents rollers from running tangent to race, providing the exceptionally even, quiet long-life operation for which Orange Roller Bushings are noted. Made in a wide range of sizes and types. Send coupon for detailed Engineering Data Book.

The Orange Roller Bushing shown above was designed for the shaft that lifts the entire spindle assembly and slide of all Bodine Automatic Drilling, Milling, Tapping and Screw Inserting Machines. Operating at high speed, this Bushing withstands repeated pressure and shock loads as the tools engage. Performance? "Very satisfactory!" reports the Bodine Corporation.

Mail Coupon for Engineering Data

Orange Roller Bearing Co., Inc., AM
Orange, N. J.
Please send me your Roller Bushing Data Book

Name..... Title.....

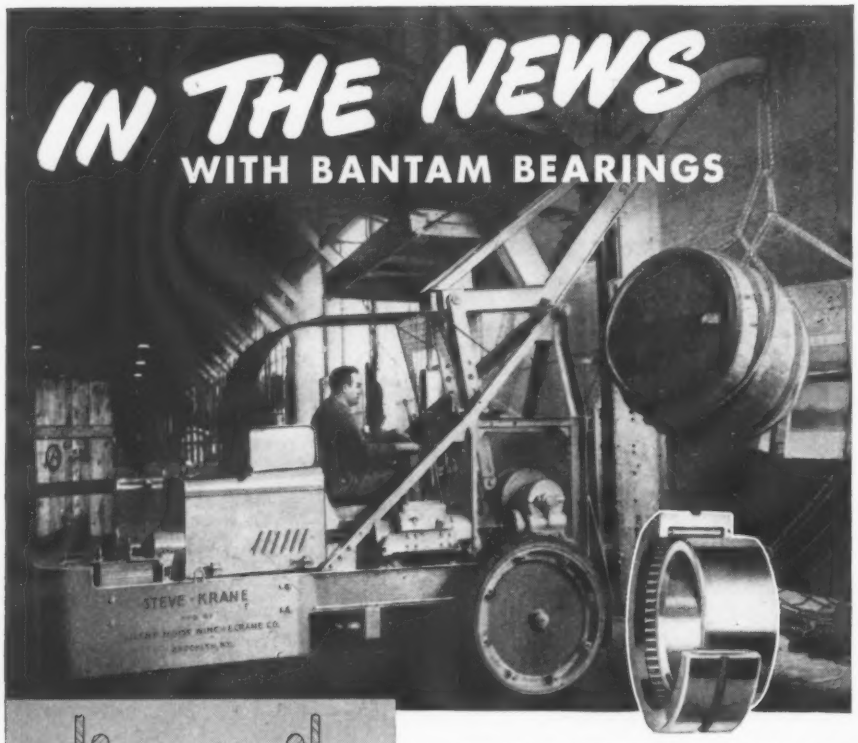
Company.....

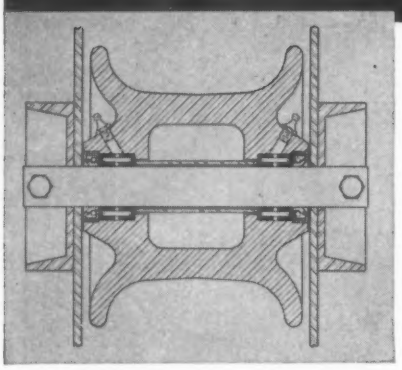
Address.....

City..... State.....

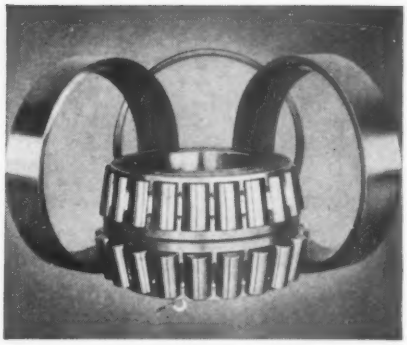
ORANGE ROLLER BEARING CO., INC.
ORANGE • NEW JERSEY

IN THE NEWS
WITH BANTAM BEARINGS



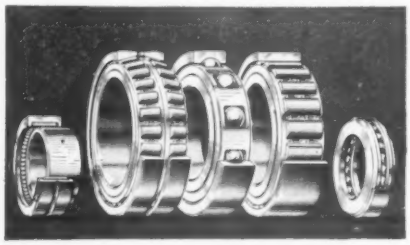


MECHANICAL "STEVEDORES" like this 5-ton STEVE-KRANE built by Silent Hoist Winch & Crane Co. are playing an important part in speeding the loading of goods and equipment for distant fronts. And Bantam Quill Bearings on the boom sheaves and rollers (shown in cross-section view) contribute to the efficiency of these cranes, because of their low coefficient of friction, high load capacity, and effective method of lubrication—while their unit construction facilitates assembly. For full details on these compact anti-friction bearings, write for Bulletin R-104.

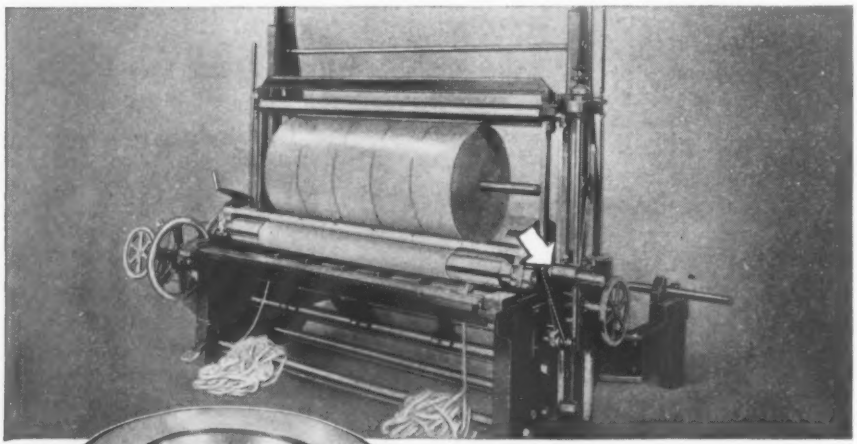


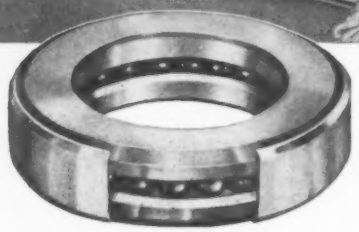
38" O.D., 21" I.D., 19½" LONG, this two-row tapered roller bearing for steel mill service is a typical instance of Bantam's skill in the design and manufacture of large bearings for special jobs. To meet the needs of America at war, Bantam today is manufacturing some of the largest anti-friction bearings ever built.

METALLURGICAL CHECK-UP is a regular part of Bantam inspection on bearings of all types. Here the grain structure of rollers and races is undergoing microscopic examination to assure conformity to metallurgical specifications.



ENGINEERING COUNSEL based on the design and application of straight roller, tapered roller, needle, and ball bearings is a vital phase of Bantam's service to industry. If you are seeking competent advice on your anti-friction bearing problems, TURN TO BANTAM.





FAST, ACCURATE SLITTING of paper is the job of the Camachine 8, Model 10, product of Cameron Machine Company. Among the factors in the popularity of this machine in paper mill finishing rooms and converting plants is the use of Bantam Ball Thrust Bearings.

ARMY E NAVY

BANTAM BEARINGS

STRAIGHT ROLLER · TAPERED ROLLER · NEEDLE · BALL

BANTAM BEARINGS CORPORATION · SOUTH BEND · INDIANA

SUBSIDIARY OF THE TORRINGTON COMPANY · TORRINGTON, CONN.

GEOMETRIC

Pointers

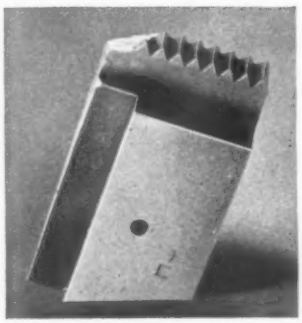
FOR SAVING HIGH SPEED STEEL

★ ★ ★ ★ ★

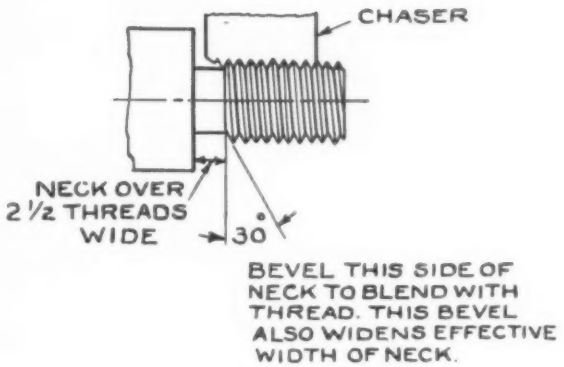
No. 2
AVOID SHOULDER THREADING

★ ★ ★ ★ ★

Help to save high speed steel! Help to reduce scrap losses by designing your parts to avoid threading close to a shoulder. There are many difficulties in this type of threading, chief among which is the fact that short chamfer chasers must be specially made. In addition, the short chamfer makes it more difficult to produce accurate threads without rethreading. This is especially true in threading stainless steel, chrome nickel and other alloys used in war production. The photograph at left illustrates still another waste of valuable tool steel, caused by the chasers hitting the shoulder and breaking.



These are but a few of the many difficulties created when close-to-shoulder threads are specified, AND THEY ALL HANDICAP THE WAR PRODUCTION PROGRAM. These difficulties can easily be avoided. The drawing below shows one way in which a screw may be designed to permit the use of long chamfer chasers, a method which can be employed even if parts are already in production. Write us for additional suggestions applying to your specific wartime threading jobs. The Geometric Tool Company, New Haven, Conn.


CHASER
NECK OVER 2 ½ THREADS WIDE
30°
BEVEL THIS SIDE OF NECK TO BLEND WITH THREAD. THIS BEVEL ALSO WIDENS EFFECTIVE WIDTH OF NECK.

The Geometric Tool Company is listed on the Treasury Department's Roll of Honor of those companies which contribute at least 10% of their gross payroll for War Bonds. Buy War Bonds each payday! Insure Victory for America now, and financial security for yourself in the future.

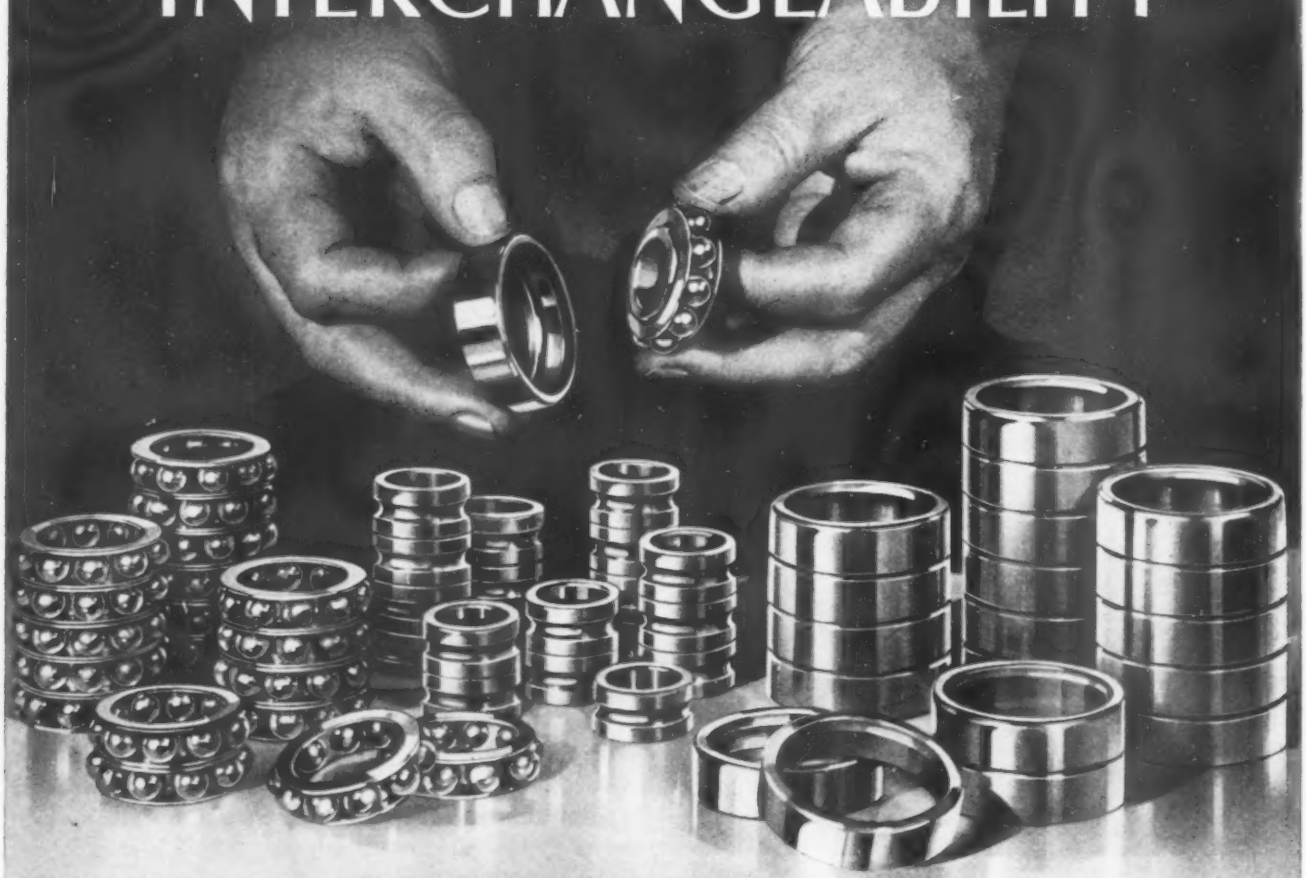
ANOTHER GOOD *Pointer*

GEOMETRIC

SELF-OPENING DIE HEADS
COLLAPSING TAPS
CHASER GRINDING MACHINES

SOLID ADJUSTABLE DIE HEADS
SOLID ADJUSTABLE TAPS
THREADING MACHINES

A THIRD OF A CENTURY of INTERCHANGEABILITY



DURING all the years since NORMA-HOFFMANN Ball Bearings were introduced, PRECISION has been their distinguishing feature.

"But"—we are often asked—"has this PRECISION been unvarying, over all these years?"

An actual test of the INTERCHANGEABILITY maintained in day-after-day, year-after-year NORMA-HOFFMANN production would (we believed) give a convincing answer to the question—since, in the bearing world, INTERCHANGEABILITY of parts cannot be realized unless PRECISION is maintained.

So we secured a number of stock NORMA-HOFFMANN Open Type Ball Bearings—some made 30-odd years ago, others at intervals since. These we dis-assembled and "mixed up"—interchanged inner rings, cages with balls, and outer rings—and reassembled them into complete bearings which were then subjected to our rigid PRECISION tests.

In every case, we found the reassembled unit to be a true NORMA-HOFFMANN PRECISION Ball Bearing, with internal accuracy unchanged and in every respect conforming to our exacting standards.

This is NORMA-HOFFMANN PRECISION—not new or variable or "special"—but a time-tested, inflexible standard of quality. This PRECISION is YOUR assurance of bearing speed-ability and service-ability—YOUR safeguard against bearing troubles.

•

WRITE FOR THE CATALOG
LET OUR ENGINEERS
WORK WITH YOU

•

NORMA-HOFFMANN PRECISION BEARINGS

• • • •

BALL • • ROLLER • • THRUST

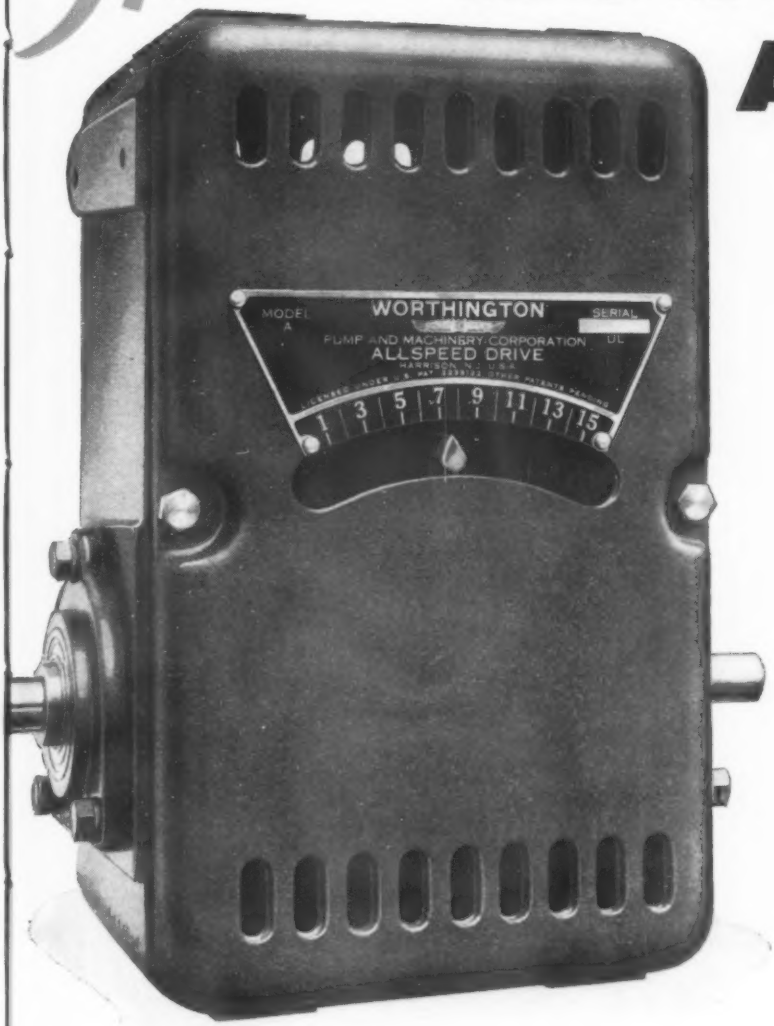
for

EVERY LOAD, SPEED AND DUTY

NORMA-HOFFMANN BEARINGS CORP'N., STAMFORD, CONN. . . . FOUNDED 1911

Introducing the WORTHINGTON ALLSPEED DRIVE

(MODEL A ⅓ to ¾ H.P.)



- **16:1 RATIO (FROM ONE-EIGHTH MOTOR SPEED TO TWICE MOTOR SPEED)**—For all speeds for all needs.
- **THE ONLY DRIVE WITH AUTOMATIC POSITIVE BELT TENSIONING**—No springs. Assurance of smoother overall operating efficiency.
- **INSTANTANEOUS AND SMOOTH STEPLESS CONTROL**—Minimum through maximum speeds with a "finger-tip touch" while unit is in operation.
- **SINGLE-UNIT CONSTRUCTION . . . MORE COMPACT THAN ANY DRIVE IN ITS FIELD**—Can be installed in any position. Applicable to any machine . . . new or old. Easily accessible.
- **SIMPLICITY OF DESIGN**—Minimum working parts . . . no springs . . . trouble-free operation.
- **STURDY CONSTRUCTION . . . CONSERVATIVELY RATED**—Oversize retainer type ball bearings.
- **LOW MAINTENANCE COST**—Belts removed easily and quickly without dismantling unit.
- **AVAILABLE FROM STOCK**—Arrange for a demonstration today by writing the authorized WORTHINGTON ALLSPEED DRIVE DEALER in your area, or the nearest Worthington District Office.

Designed specifically to speed up war production by finding the peak production speed of any productive unit.

THE WORTHINGTON ALLSPEED DRIVE has been thoroughly job tested on many applications. It has proved its efficiency and stamina on a wide variety of work, including the finest precision jobs.

Reports from plant engineers and time study men show an increase in production ranging from 25% to 200%.

THE WORTHINGTON ALLSPEED DRIVE will also play an important part in your training of inexperienced help by allowing you to increase the speed of the driven unit to parallel the growing experience of the operator . . . for maximum productive man and machine hours with minimum spoilage.

WORTHINGTON PUMP AND MACHINERY CORPORATION
GENERAL OFFICES: HARRISON, N. J.

MV2-9

Peak Production Speed with Finger-Tip Control

WORTHINGTON ALLSPEED DRIVE

WE'VE MADE BILLIONS -and not one has loosened

THEY'RE on oil well pumps—some for twelve years. They're standard equipment on rock drills—industry's toughest fastening problem.

They're on tanks, planes, guns—all kinds of wartime material—all kinds of peacetime equipment.

All told, billions of Elastic Stop Nuts have gone to work.

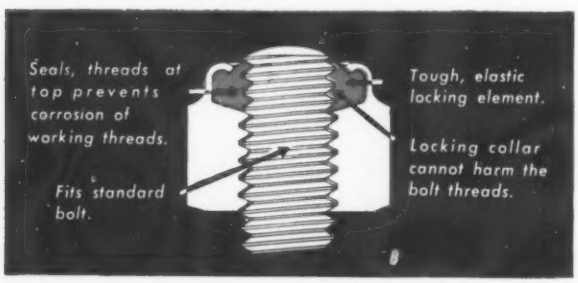
And as far as we know, not one has failed to do its job.

That job is to hold fast and stay put—come what may in the way of vibration, jar or chatter.

Of course the need for such dependable fastenings in war goods and planes is paramount. Some planes take as many as 35,000 in a single ship.

So even at our 4,000,000-a-day rate (which soon will double) the demand keeps growing.

But this constant call for more and more—to meet the exacting responsibilities of war—gives ample proof that Elastic Stop Nuts answer every need for secure locking and speedy fabrication.


Seals, threads at top prevents corrosion of working threads.
Fits standard bolt.
Tough, elastic locking element.
Locking collar cannot harm the bolt threads.

Write for folder explaining the Elastic Stop self-locking principle.

ELASTIC STOP NUT

CORPORATION OF AMERICA

2330 Vauxhall Road, Union, N. J.

WITH THE RED COLLAR—SYMBOL OF SECURITY

Designed to SOLVE YOUR MARKING PROBLEMS

Out of greatly accelerated production and seemingly impossible demand for faster, better metal marking, have come many improvements and innovations now reflected throughout our complete line of precision marking equipment. Your copy of our new catalog supplement No. 43 is now ready. It is a guide to the newest type of precision marking equipment designed for today's wartime needs and with an eye to the future.

NOBLE & WESTBROOK MANUFACTURING CO.
2 Westbrook Street
EAST HARTFORD, CONN.

MARK IT BEST WITH NOBLEWEST — NOBLEWEST IMPROVED MARKING DEVICES

How GUSHER COOLANT PUMPS SPEED Production

Model 5-P3
There's a large mounting flange on this new model, so as to make it interchangeable with large Gusher Pumps. Right or left discharge. 1/10 H.P. Maximum Capacity; 10 g. p. m.

A Gusher Pump delivers coolant exactly when you want it for honing, milling, grinding, cutting, tapping and threading . . . from a dribble to 200 g. p. m. No lost time . . . no bottleneck in production.

Simple design makes for efficient, dependable and trouble-free operation. Many *patented and exclusive* advantages no other pump can offer.

The leading machine tool manufacturers use Gusher Coolant Pumps. Include Gusher Pumps in your specifications. Write for data.

THE RUTHMAN MACHINERY CO.
1809 READING ROAD CINCINNATI, OHIO
Largest Exclusive Builders of Coolant Pumps

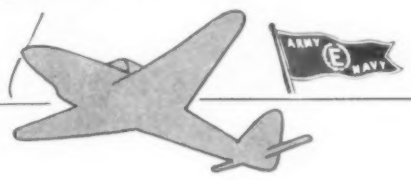
THE HEADLINE STORY YOU'LL NEVER READ

Eating into cold, hard metal... never stopping... this machine turns out a vital airplane part every few seconds. Its work day is 24 hours long... *every* day. Month after month, this machine, and other thousands like it, are playing a mighty part in winning the war. Yet, you'll never read their story in your evening paper!

In the workhead of these machines are Fafnir Ball Bearings... hard-working, dependable bearings which must hold tolerances on the nose under ceaseless punishing conditions. There is no time to "baby" them.

They, like millions of other Fafnirs, are *staying on the job*, are helping America's industrial machines to establish performance records that match... deed for deed... the more spectacular, "newsy" records of Fafnir-equipped tanks, planes and guns.

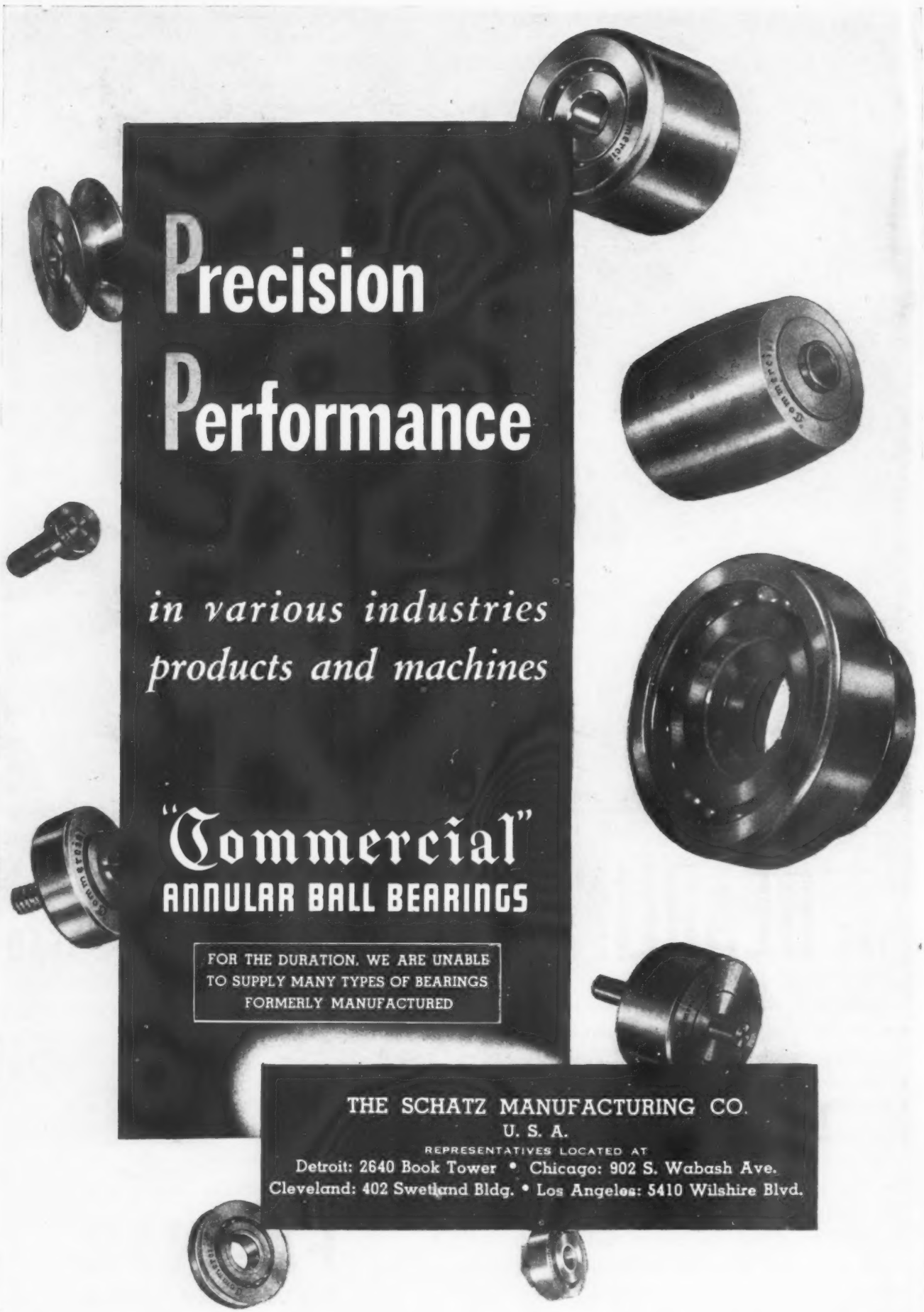
Wherever you find outstanding performance, you'll usually find Fafnirs. The Fafnir Bearing Company, New Britain, Connecticut.



FAFNIR

BALL BEARINGS

THE BALANCED LINE - FOR ORDNANCE, AIRCRAFT AND INDUSTRIAL MACHINERY


Precision
Performance
in various industries
products and machines
"Commercial"
ANNULAR BALL BEARINGS
FOR THE DURATION, WE ARE UNABLE
TO SUPPLY MANY TYPES OF BEARINGS
FORMERLY MANUFACTURED
THE SCHATZ MANUFACTURING CO.
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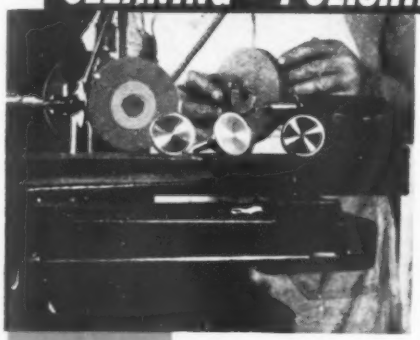
FASTER, EASIER
DE-BURRING ★ CLEANING ★ FINISHING ★ POLISHING
In a Single Operation with

WELDON ROBERTS
Brightboy
REG. U.S. PAT. OFF.

BECAUSE "The Soft Rubber Binder Cushions The Abrasive"

CLEANING • POLISHING



Tools, taps, dies, flush sets, drills, parts, in aluminum alloy, steel or brass

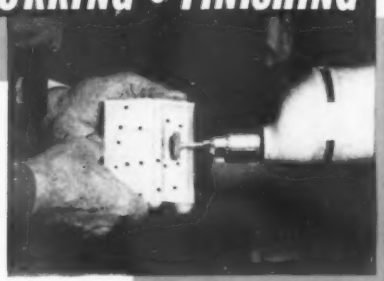
Brightboy's *rubber binder* controls the abrasive action, providing a unique, highly gratifying finished surface. *At the same time* it cleans and polishes, bridging the gap between a grind and a buff. Ideal for close-tolerance work.

No special setups required. Brightboy is ready for immediate use. Available in wheels, blocks, sticks, rods and special shapes for innumerable manual, bench machine and drill press applications. Safe and easy to use by any worker. No special training necessary.

Information, prices and "Methods and Applications" leaflet from your dealer or

BRIGHTBOY INDUSTRIAL DIVISION
WELDON ROBERTS RUBBER CO. Newark, N. J., U.S.A.

DE-BURRING • FINISHING

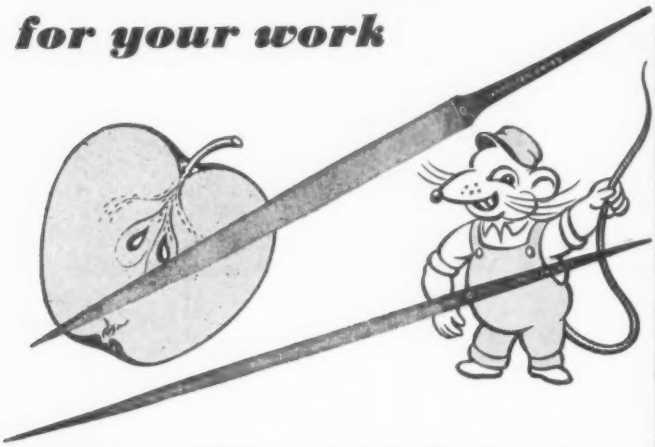


Holes and edges in alclad part

1. NO "TIME OUT" CHANGES IN METHODS—
   Brightboy is used in the conventional manner
2. NO SPECIAL TRAINING NECESSARY
3. NO SPECIAL PREPARATION—
   Ready for *immediate* use
4. NO WASTE—
   Every bit is usable

Removes Light Digs, Tool and Heat Marks
Cleans Welded and Soldered Joints
Finishes Dies
De-burrs Light Stampings and Machined Parts

Maybe you need an APPLESEED *or a* RAT-TAIL *for your work*

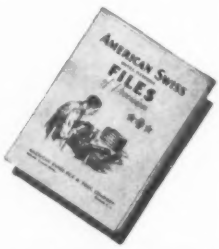


How can an appleseed or a rat-tail help you? In your accurate filing work . . . for these are two of the many shapes of "American-Swiss" Swiss-Pattern Files. The special forms of the Appleseed or Pippin File and the Rat-tail or Taper Round File make each adapted to various precision or intricate filing jobs.

We maintain a service department for advice on the selection and use of Swiss-Pattern Files, and these file specialists will gladly recommend the most suitable shape, cut, and size of file for your particular requirements without charge or obligation. Our 40 years of experience in specializing on Swiss-Pattern files assures recommendations you can depend upon, and the large line of more than 3,000 different "American Swiss" Files includes exactly the right file for every precision filing job.

Write for This Catalog

This helpful catalog contains complete descriptions, dimensions and lists of American Swiss Swiss-Pattern Files for all purposes. Send for your copy today.



American Swiss File & Tool Co., Elizabeth, N. J.

FILES ONLY THE BEST TOOLS

AMERICAN SWISS

SWISS PATTERN FILES

Saves Many Production Hours

Speeds Nut Tightening Time 75%

Each removable head fits TWO sizes of nuts. Three handle sizes . . . each handle takes five different heads. These instantly reversible ratchet wrenches fit over long studs . . . are easy to use in narrow places. Carried by leading mill supply houses.

GREENE, TWEED & CO.
Bronx Blvd. at 238th St.
New York, N. Y.

FAVORITE *Reversible Ratchet* WRENCH

BUSHINGS
GAGES
BAR STOCK
CENTERLESS BLADES
DRAWING DIES
CENTERS
TALIDE METAL..
Tools, Dies and Wear Parts
"Tipped with TUNGSTEN CARBIDE are keeping war plants in constant, uninterrupted production, with the added advantages of . . .
★ Longer Life
★ Increased Output
★ Maintained Size
★ Closer Tolerance
★ Fewer Rejects
helping to complete vital War Contracts on time.
TALIDE TUNGSTEN CARBIDE
Bar Stock is available in any size, diameter and length . . . for application to surfaces where wear and abrasion are troublesome.
Full Engineering Information on Request
TALIDE

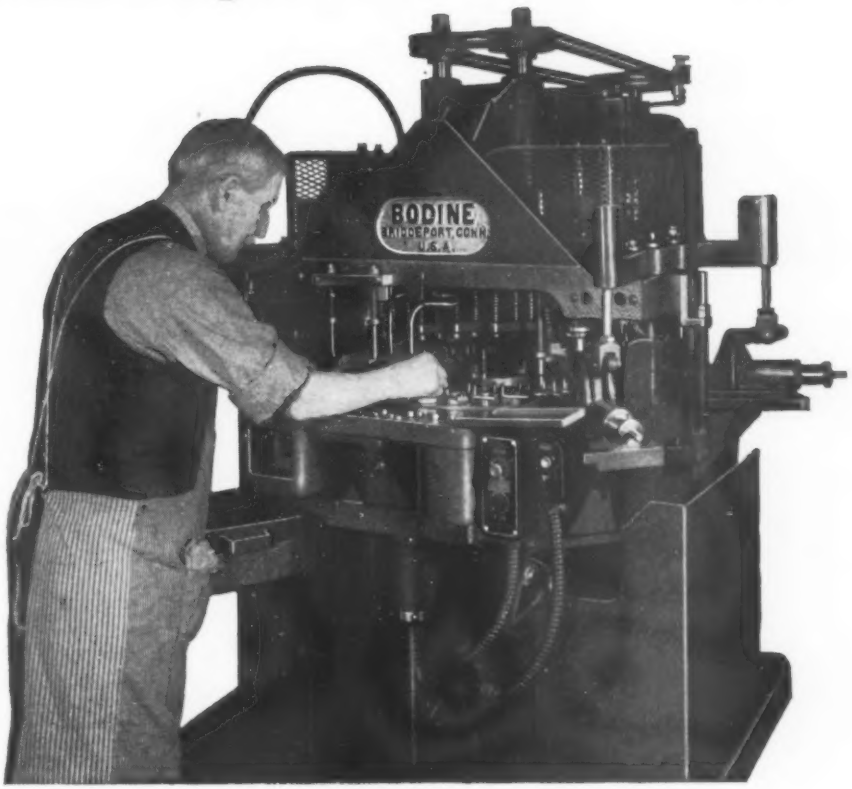
METAL CARBIDES CORPORATION

YOUNGSTOWN, OHIO

TUNGSTEN CARBIDE TOOLS · DIES · WEAR PARTS

"ROUGH RIDER" IN '98...

SMOOTH OPERATOR IN '43!



The soldier who FOUGHT under Teddy Roosevelt at San Juan Hill in 1898 can now PRODUCE under Franklin D. Roosevelt in 1943.

And many of them are doing it . . . with the help of automatic production machines such as the BODINE.

This Multiple Spindle DRILLING, MILLING, TAPPING and SCREW INSERTING Machine has been designed for high speed production, and because of its automatic indexing dial, easy feeding, and safety features, operators can be quickly trained to maintain a steady flow of small armament components.

Up to eight tools may be set up to operate vertically, horizontally, diagonally, or from an inverted position — one or all planes *simultaneously,* and all of the FOUR operations, if desired, during one cycle of the dial.

The operator merely places the work in a clamp and the various tools operate at successive stations as the dial is automatically indexed to position. Ejection is usually manual,

DRILLING, MILLING, TAPPING, SCREW INSERTING *Simultaneously*

but on certain small parts it may be automatic. Hopper feeds are also practical on some jobs. Automatic safety devices protect machine and tools; assure safety to operator.

There are six sizes of Bodine machines with capacities for drilling and tapping up to ½" dia. and up to 3½" in depth.

An added feature is the compact design. Even the largest size, which mounts 8 tools, requires but 90" x 96" floor space.

Send for Bodine's new bulletin which illustrates and describes these machines in detail.

THE
Bodine
CORPORATION
BRIDGEPORT CONNECTICUT

AUTOMATIC DIAL TYPE DRILLING, MILLING, TAPPING, AND SCREW INSERTING MACHINES

One Way to Save Steel

. . . AND THIS IS ONE

The Lamson & Sessions Company uses both methods of manufacture mentioned in this advertisement—as required by the individual specifications of the customer.

el is to produce less scrap

NE WAY YOU CAN DO IT

This is an actual, practical, everyday example of how cold forging (upsetting) conserves raw materials and reduces scrap.

We realize that the difference in scrap produced in just this one common bolt product shows up in a startling way to you. However, you can be sure that this is not "trick" photography or in any sense a fake or exaggeration, for here are the facts relating to this photograph. The example shown at left is a ¾ x 6" S. A. E. hexagon head cap screw.

Weight of Finished Bolt per 1000 pieces, 849 lbs.	Milled from the Bar	Made by Cold Forging
Raw Material Required	1639 lbs.	880 lbs.
Total Scrap Loss	759 lbs.	31 lbs.
Amount of raw material saved per 1000 pieces by upsetting method		728 lbs.

In short, excepting for the bit of metal trimmed off the head of the cap screw made by the upsetting method, *there is no scrap produced.* Since the weight of 1000 pieces of these head trimmings is only *31 lbs.*, the scrap loss that is measurable in production is less than *.031 lbs.* per bolt!

And obviously, the scrap loss in producing this same bolt by milling from the bar is 0.759 lb. per piece, *or about 25 times as much!*

That is why we can say that if a part that is made on a screw machine can be produced by the upsetting method you will save raw materials. Since heading and threading today is done to very close tolerances and with a minimum of scrap, it is extremely important to remember this when every pound of steel is "ear-marked" for a purpose—*to win the war.*

But that is not the only reason why, in war production, you should consider upsetting as a method opposed to a milled-from-the-bar product. Here are two more excellent reasons.

1. If a part now made on a screw machine can be made by upsetting, you can release a machine tool badly needed to make another part which can only be made by a screw machine!
2. Upsetting and threading a part, compared with producing the same part on a screw machine, is generally many times faster, and in every way as satisfactory or more satisfactory as the milled product.

There are still other good reasons why upsetting may solve a problem for you—and of course the relative importance of each reason we present will vary with your position in war production.

3. You can specify upset products with a reasonable expectation of getting better deliveries, without sacrificing standards of accuracy, strength or finish. (Please refer to the photograph. Upsetting uses *round* wire for the part, which is more readily available, and less expensive, than *cold hexagon drawn* bar stock used by the milling process.)
4. Accuracy and finish? The aviation industry is now using products made by the upsetting method, which meet every laboratory test and the most exacting inspections.
5. Lamson & Sessions make cap screws with a minimum tensile strength of 150,000 lbs. psi in diameters up to and including ½-inch; up to 125,000 lbs. psi in diameters over that! *A smaller bolt made by modern bolt practise will often* PROVIDE ALL THE STRENGTH YOU WANT but will require much less material—and the saving of material thus gained can be put to other war production purposes.

Engineering departments less familiar than Lamson & Sessions' engineers with these facts given you, can confidently come to *bolt specialists* for help—for our experts in bolt production are able and willing to give you correct information on your problems, and without obligation.

THE LAMSON & SESSIONS COMPANY, 1971 W. 85th St., Cleveland, O.

These four books will help you in specifying and buying "standard" bolts, nuts and "specials"

THE LAMSON BLUE BOOK—is our complete Catalog of standard products excepting our Aircraft products.

"BOLTS, NUTS & SCREWS"—70 pages of technical and practical information. First copy gratis, requested on your letterhead. Additional copies $1 each.

"BOLT, NUT & RIVET STANDARDS"—175-page book published by the American Bolt, Nut & Rivet Manufacturers Association, 1550 Hanna Bldg., Cleveland, Ohio. Price one dollar per copy. *(Order from publisher, please.)*

"SIMPLIFIED STOCK LIST"—Of bolts, nuts and screws, conforming to latest revisions of the Office of Price Administration, and of great value in showing you in what ratio quantities of various standard products are kept in stock for deliveries, by your jobbers and in our own (and other bolt manufacturers') warehouse stocks.

LAMSON & SESSIONS

BOLTS · · NUTS · · COTTERS · · CAP SCREWS · · SPECIALS

Your Jobber Stocks the Lamson Line

TURNER
UNI-DRIVE
Motorizes Machine Tools

Makes a Real Fighting Tool

INCREASE YOUR PRODUCTION CAPACITY 25% TO 300%

● This is no time to waste time... America and her Allies, fighting side by side all over the world for the preservation of the United Nations and freedom, have a job to do... *and fast!* Enlist the aid of Turner Uni-Drive units in your plant and you'll at once find what *a real fighting tool you have in your organization* to help you speed up production... keep down power costs ... eliminate costly overhead counter shafts. See your dealer today or write us for full information.

For Lathes, Milling Machines, Shapers, Turret Lathes, Radial Drills, Boring Mills, Hobbing Machines and various machine tools... also Browne & Sharpe and Cleveland Automatic Screw Machines. Can also be adapted to many special applications.

SOME USERS OF TURNER UNI-DRIVE TO MOTORIZE MACHINE TOOLS

American Brake Shoe & F. Co.
Kellogg Division
Southern Wheel Division
Arnold Schwinn & Co.
Augusta Arsenal
Bendix Aviation Corp.
Cessna Aircraft Corp.
Chicago, Rock Island & Pacific R. R. Co.
Chicago Screw Company
Combustion Engineering Co.
Congoleum Nairn, Inc.
Driver Harris Co.
Electric Auto-Lite Co.
Frankfort Arsenal
Frisco Lines
Imperial Brass Mfg. Co.
International Projector Co.
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Pomona Pump Co.
Proctor & Gamble Co.
Republic Steel Corporation
Revere Copper and Brass, Inc.
SKF Industries
Sullivan Dry Dock Co.
Thos. A. Edison Co.
Toledo Scale Co.
Wagner Electric Co.
The Timken-Detroit Axle Co.
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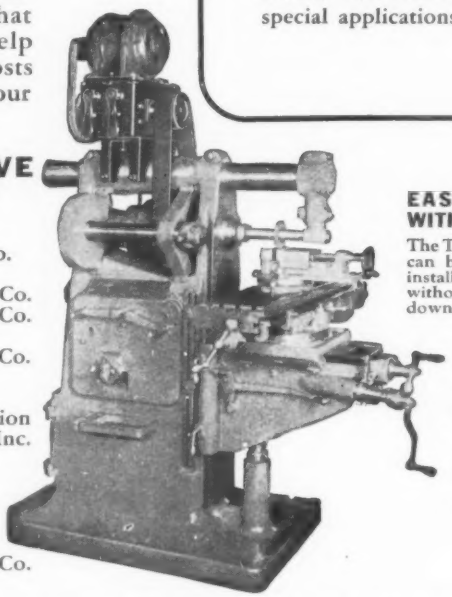


EASILY INSTALLED WITHIN 2 to 4 HOURS

The TURNER UNI-DRIVE can be quickly and easily installed within a few hours without completely shutting down your shop.

Now successfully used in many of America's largest defense plants. Guaranteed for 1 year against defects in workmanship and materials, and sold subject to return for full credit within 60 days if not satisfactory.

TURNER UNI-DRIVE MAKES 'EM TURNING FASTER

NOW AT WORK FOR VICTORY ★★★

THE TURNER UNI-DRIVE COMPANY

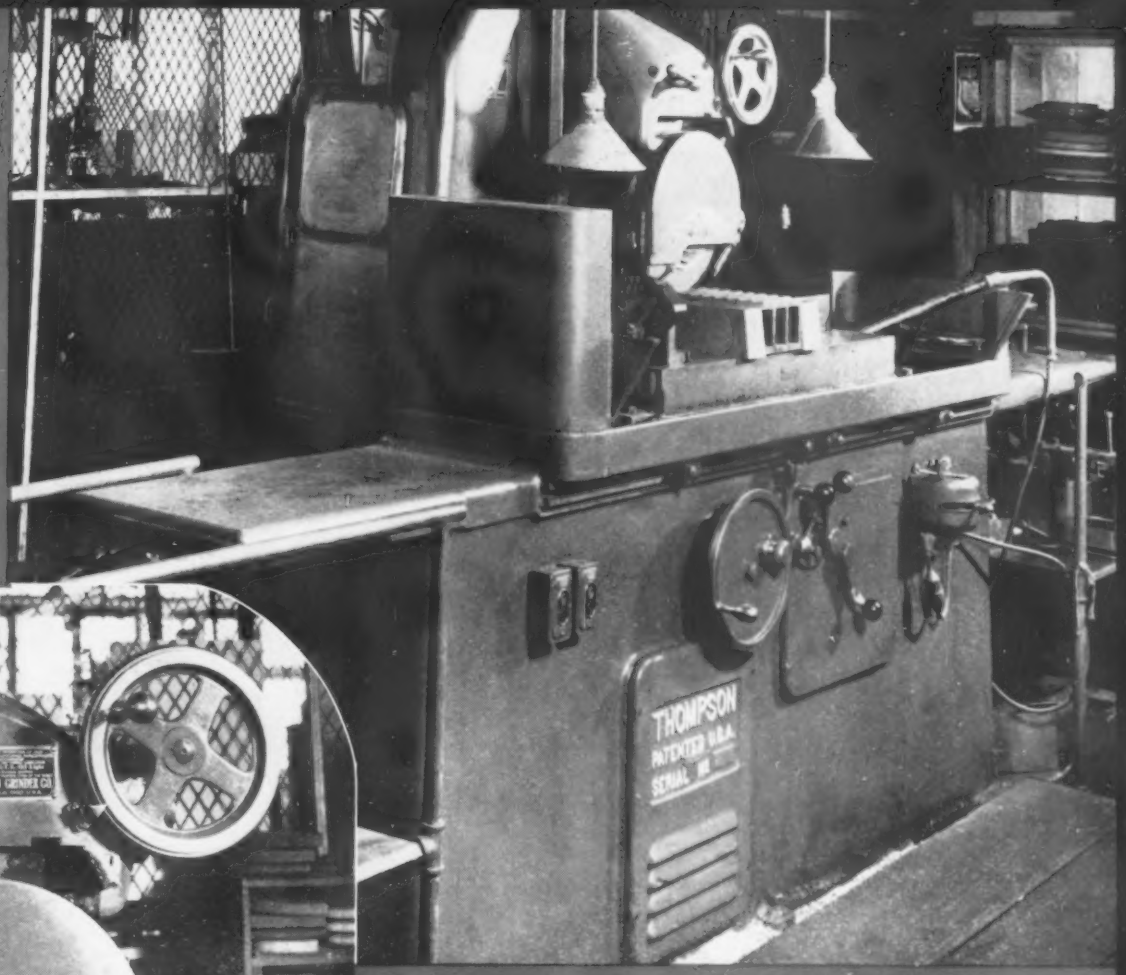
(Sales Division: Turner Machinery Co.)

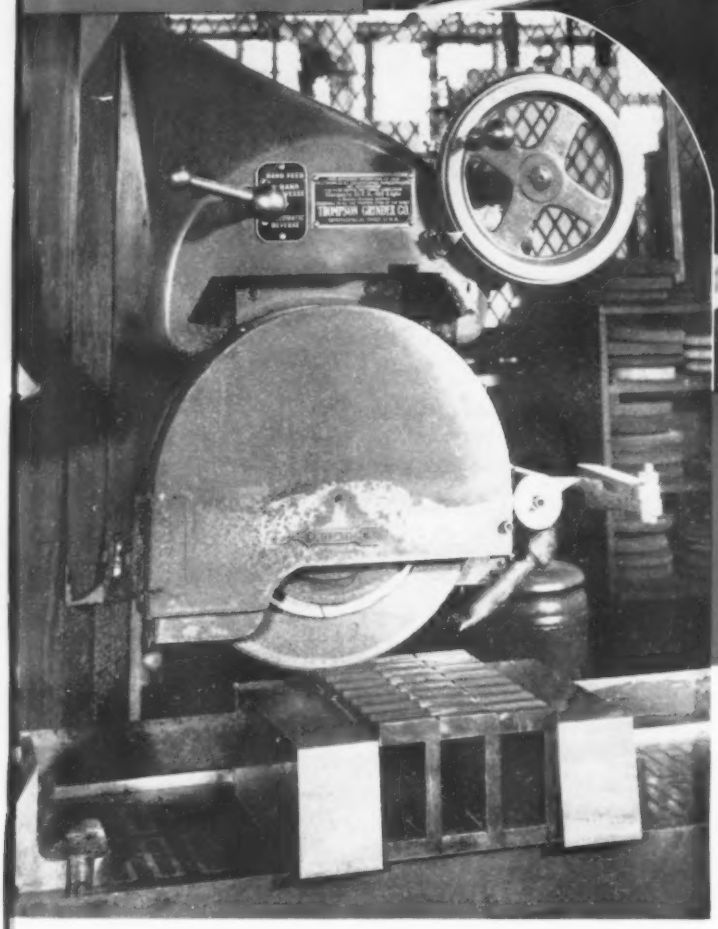
3416 TERRACE STREET

KANSAS CITY, MISSOURI

PRODUCING MACHINE TOOL DRIVES • ORDNANCE TOOLS • AIRCRAFT FITTINGS

Thompson Grinders





TOOLS and MACHINES
The bulwark of our War Effort at home

● The machine in this instance is a Thompson Grinder. The full hydraulic drive to table and wheel head provides smooth, shockless operation with resulting better finish and much closer tolerances. The Tools are Tool Retracting Blocks of hardened 1020 Carbon steel being ground quickly—accurately on this model B Thompson.

This is another of the thousands upon thousands of jobs being ground daily on Thompson Grinders to speed up our production and maintain desired accuracy on urgent war work.

Full descriptive bulletin upon request.

THOMPSON BUILDS

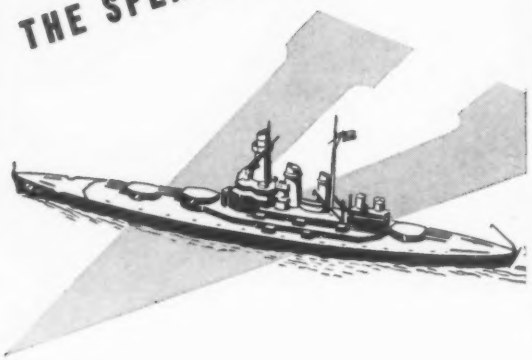
a full line of hydraulic surface grinding machines for all types of flat surface grinding from the small tool room grinder 6″ x 18″ to the larger C types 36″ x 220″.

THE Thompson GRINDER CO.

SPRINGFIELD, OHIO

Metal Shapes—

THE SPEARHEAD OF VICTORY



It takes parts by the thousands, of all kinds and shapes, to make up a "battlewagon" and its equipment. Our job now is to make such parts for America's war machines . . . and we're at that job 100%.

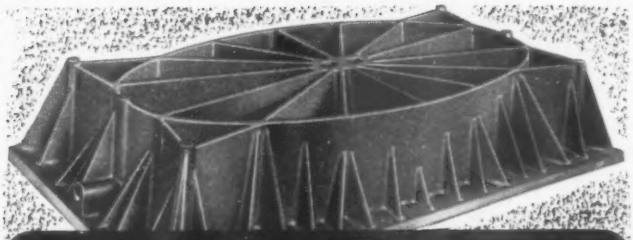
When Victory comes and we return to work for industry's peacetime needs, lessons learned in war production will yield liberal dividends in new skills, new methods and new materials . . . and in these dividends, RITCO's peacetime customers will generously share.

SPECIAL BOLTS, NUTS, AND STUDS
DROP FORGING AND DIE SINKING
SCREW MACHINE PRODUCTS
HEAT TREATING
SPRAYED METAL SERVICE

Estimates gladly submitted.
Send samples or blueprints.
Catalog on request.

RHODE ISLAND TOOL CO.
148 West River St., Providence, Rhode Island
Serving American Industry Since 1834

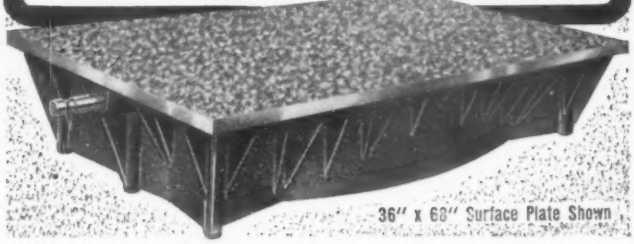
RITCO



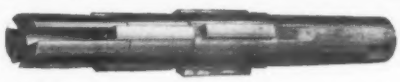
You Can Get **PROMPT DELIVERIES** *on* **SMITH MASTER SURFACE PLATES**

and there is a wide selection of standard sizes available ranging from 8" x 12" to 48" to 120". Smith MASTER Surface Plates have successfully met Aircraft and Ordnance specifications requiring a surface tolerance of one ten-thousands of an inch. Many plants have reordered several times. When your inspection or production departments demand action, you can depend on Smith's enlarged facilities for prompt deliveries. For sizes available and prices, write, wire or phone.

SMITH TOOL & ENGINEERING CO.
Precision Measuring Equipment
802 N. SANDUSKY AVE. BUCYRUS, OHIO



36" x 60" Surface Plate Shown



Production Goes *UP* . . .
Production Costs Go *DOWN* . . . with
NICHOLSON *Expanding* MANDRELS

Time-saving economy tools for holding work while being machined between centers on lathes, grinders, millers, shapers, etc. Made of hardened tool steel, precision ground.

Sold singly or in sets.

Prompt delivery.
Bulletin No. 741

W. H. NICHOLSON & CO.
114 OREGON ST., WILKES-BARRE, PA.
Other Products: Arbor Presses—Control Valves—Steam Traps—Floats
Flexible Couplings—Compression Shaft Couplings

LITTELL AUTOMATIC CENTERING **REELS**

No. 3 Littell Automatic Centering Reel. Coil capacity, 300 lbs.

ASK FOR BULLETINS

Plain and Motor Driven
Spindle and Cradle Types

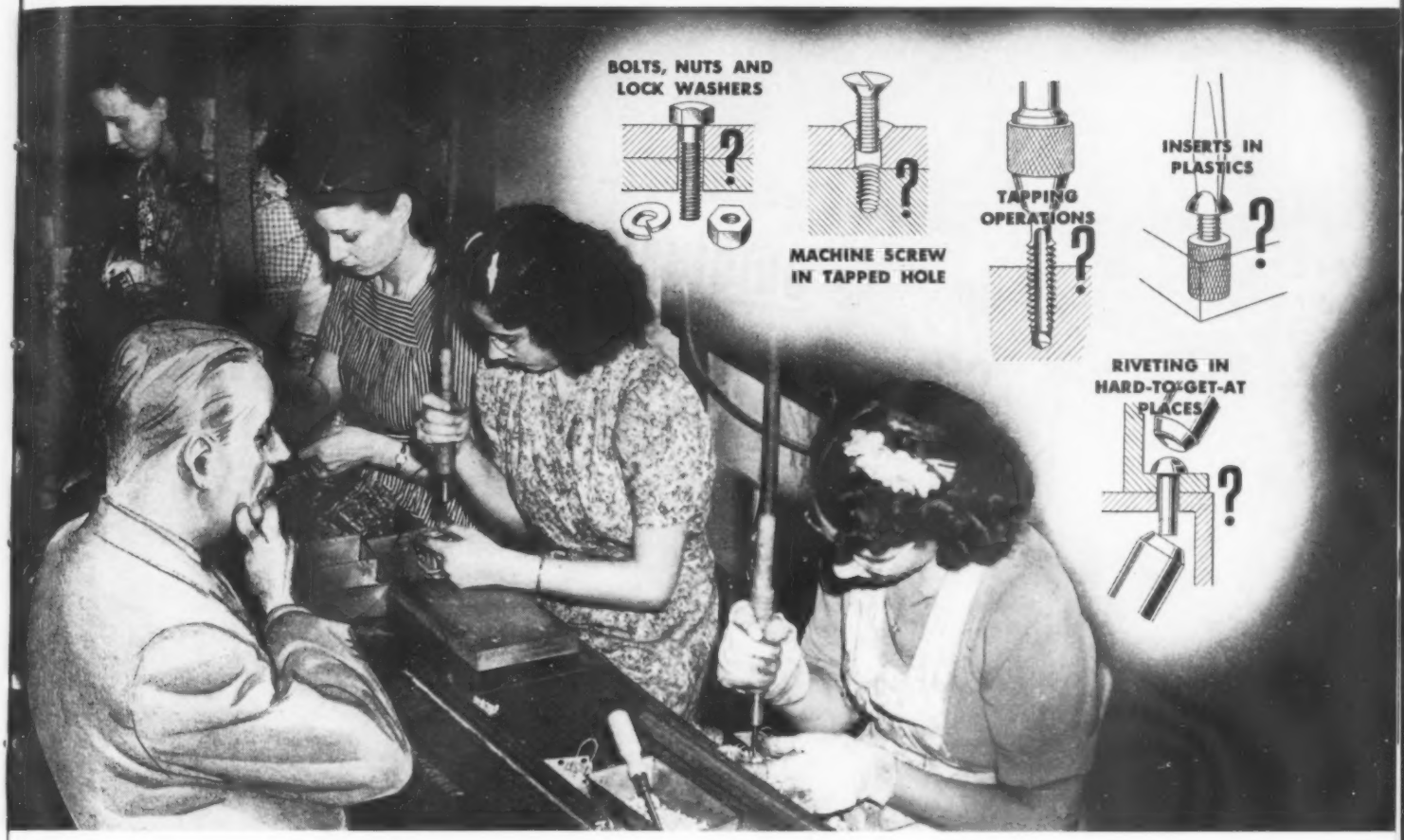
FASTER loading, centering and unreeling of coil stock is assured with LITTELL Automatic Centering Reels. Made in 100-lb. to 20,000-lb. capacities, for hand or automatic feeding. Spindle and Cradle types.

LITTELL PRODUCTS INCLUDE:

Roll Feed units for punch presses—Feeding and Straightening Machines—Power Straightening Machines—Ball-Bearing Reels—Winders—Coil Cradles—Air-Blast Valves and Nozzles—Safety Pickers—Scrap Cutters—Oilers—Assembly Machines—and Automatic Centering Reels. *REQUEST BULLETINS.*

F.J. LITTELL MACHINE CO.
4169 RAVENSWOOD AVE. CHICAGO, ILL.

Question every fastening job



ASK—*"Why Can't It Be Done the Simple Way . . with time-saving P-K Self-tapping Screws?"*

That question is standard practise with hundreds of engineers and production men who are trying to conserve vital time and labor. They put it to themselves, and to their associates . . . not only at the drafting board but also on the production line.

They don't expect Parker-Kalon Self-tapping Screws to be the best means of making EVERY fastening under ALL conditions. But they know that, for a *very large percentage* of metal and plastic fastening jobs, these Screws offer a combination of ease, speed and real security that no other fastening device or method can match!

How to Save Operations . . . to Save Vital Time and Labor

Make it *your* practise to see that you can't employ the simple Self-tapping Screw method before you put up with a more difficult one. Wherever P-K Self-tapping Screws can be used, operations will be eliminated, vital time and labor will be saved. You merely drive P-K Self-tapping Screws into plain, untapped holes. Such simplicity eliminates tapping and tap maintenance . . . solves the problem of getting scarce taps . . . stops fumbling with bolts and nuts and placing of lock washers . . . does away with inserts in plastics . . . cuts out riveting and welding in hard-to-get-at places.

Call in a P-K Assembly Engineer to check over fastening jobs with you. He can show you how to search out ALL opportunities to apply P-K Self-tapping Screws. And, he'll recommend them only when they will do the job better and faster. If you prefer, mail in assembly details for recommendations.

Change to Self-tapping Screws Overnight . .

No matter what kind of material you're working with . . . light or heavy steel, cast iron, aluminum, brass, plastics . . . you can adopt P-K Self-tapping Screws to advantage. And you can make the change-over without interrupting production. No special tools or skilled help are required. Parker-Kalon Corporation, 194-196 Varick Street, New York, N. Y.

SELF-TAPPING SCREWS FOR EVERY METAL AND PLASTIC ASSEMBLY

PARKER-KALON

Quality-Controlled

SELF-TAPPING SCREWS

Give the Green Light • to War Assemblies

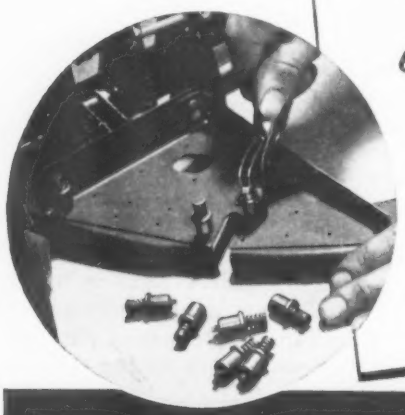
CLECO
SHEET HOLDERS

Why the ORIGINAL Sheet Holder Offers You the FINEST Service:

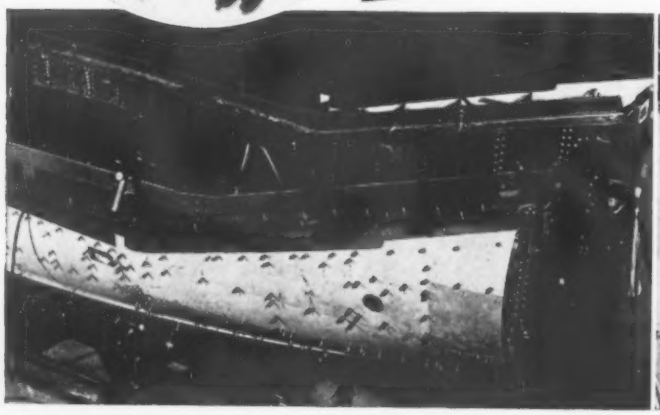
1. Saves 80% of time ordinarily required for securing sheets prior to riveting. Eliminates use of holding screws or bolts.
2. Exerts 50 lbs. of *even* clamping pressure—no buckling or distortion—no loosening due to vibration of riveting.
3. Different color for each size facilitates identification, speeds up insertion.
4. Access to *only one side* is necessary for insertion and removal.
5. Locking stem has correct diameter for rivets being used—no drilling or reaming.
6. EXCLUSIVE REPAIR AND EXCHANGE SERVICE. Damaged sheet holders can be sent to our plant or branch office repair stations for prompt repair at nominal cost. Exchange stocks also available at these repair stations.

Write for Bulletin 87. THE CLEVELAND PNEUMATIC TOOL COMPANY, 3781 East 77th St., Cleveland, Ohio.
Branch offices in all principal cities.

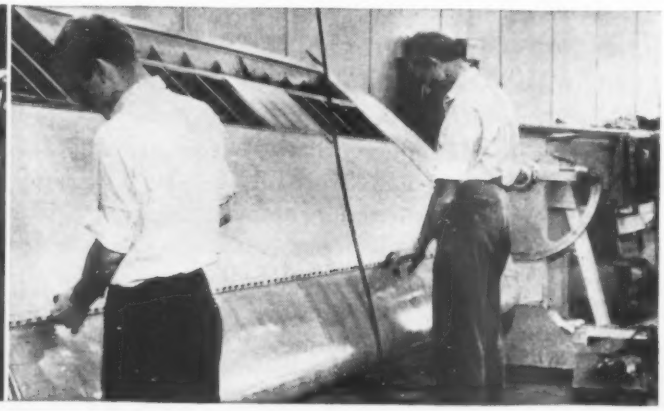
Cleco Sheet Holders being used on a Nose Web



★ **BUY U. S. WAR BONDS AND STAMPS**

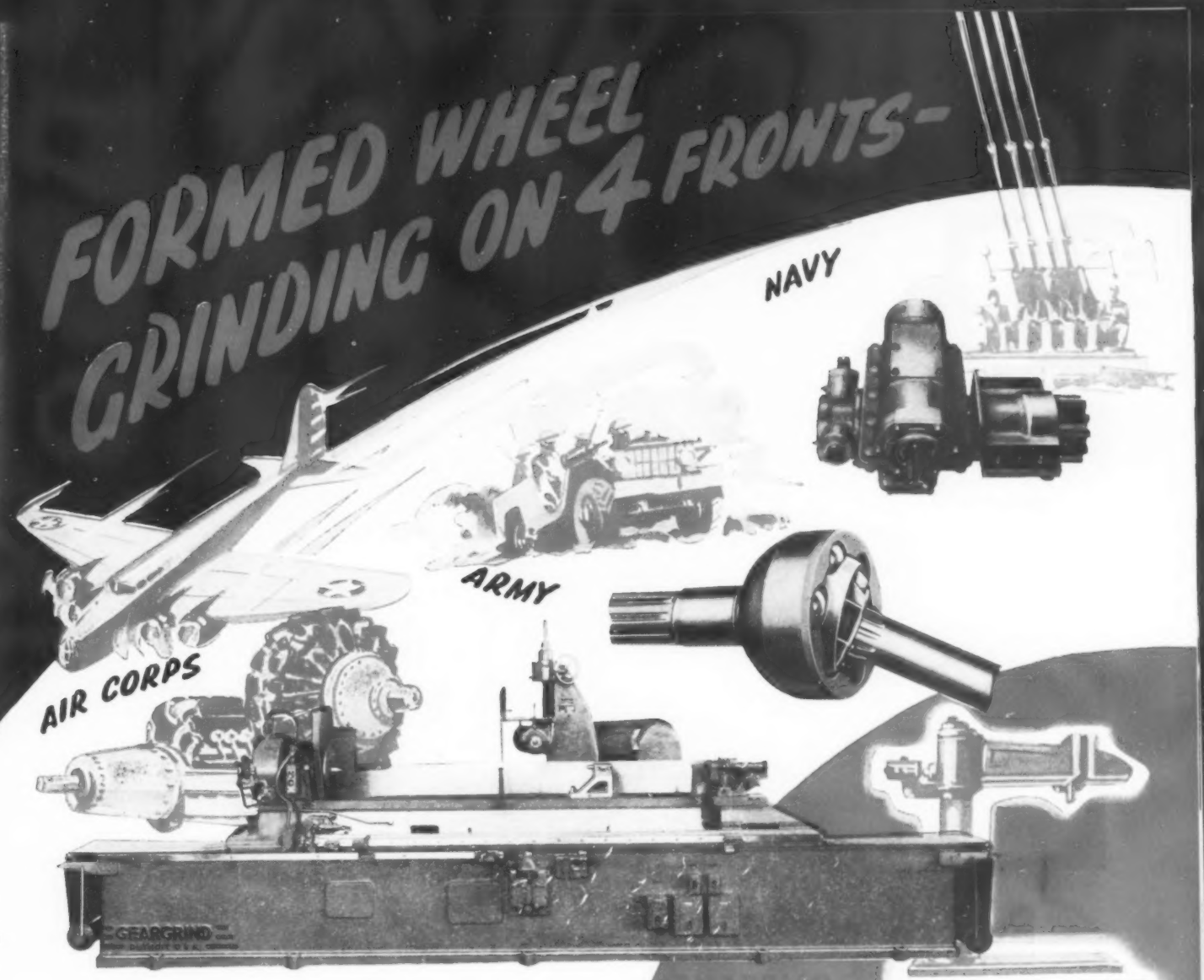


Cleco Sheet Holders on a Fuselage Assembly in Jig



"Clecoing" an Airplane Wing

FORMED WHEEL GRINDING ON 4 FRONTS—



GEARGRIND Machines are finish grinding gears, splines and racks for other machine tools that are basic in the war effort.

GEARGRIND Machines are grinding the accurate, precision gears, prop and crankshafts that go into aviation engines.

GEARGRIND factories are producing the Rzeppa Constant Velocity Universal Joint so essential in all front wheel and multiple wheel drive army units from jumping jeep to heavy ordnance trucks.

GEARGRIND is helping the Navy train its guns, by manufacturing the fine, exact gear trains that control their action.

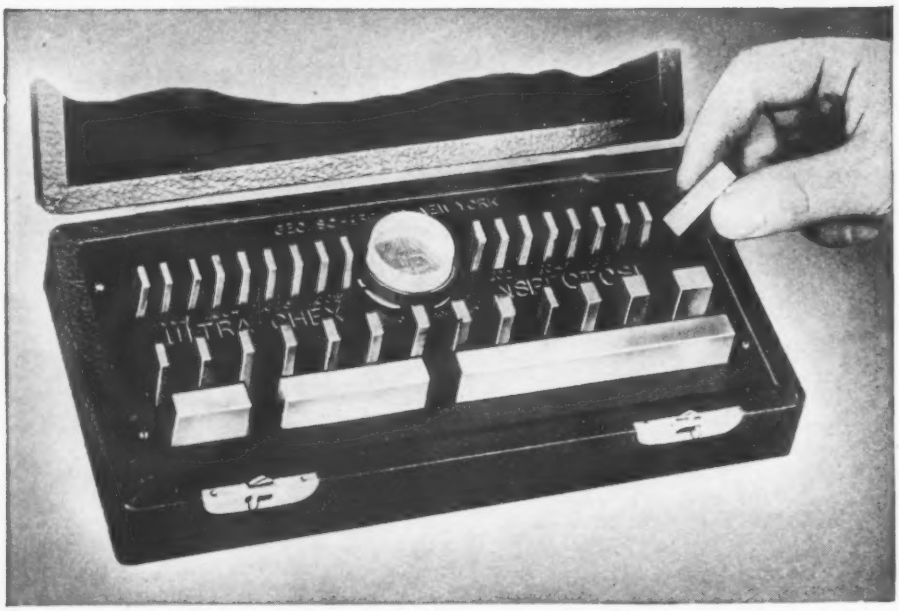
INDUSTRIAL MACHINE TOOLS

The Formed Wheel Method was originated by the Gear Grinding Machine Company, the largest manufacturer of machines for the Formed Wheel Grinding of hardened external and internal gears, external and internal involute splines, straight splines, serrations and racks. Catalog of GEARGRIND machines, special equipment and contract grinding mailed on request.

The GEAR GRINDING MACHINE COMPANY
DETROIT, MICH. U.S.A.

ACCURACY

Ultra-Chex



Precision Length Standards

PROVIDING COMPREHENSIVE, RELIABLE SIZE CONTROL ACCURATE TO .000008"

ULTRA-CHEX meet the tremendous demand for precision length standards that are sufficiently reasonable in price for frequent use. They have been designed and manufactured in order to provide an absolutely dependable system of size control at a price that places eight millionths accuracy within the reach of every shop and tool room.

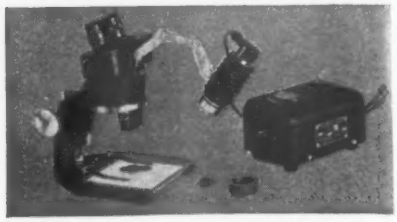
ULTRA-CHEX make it possible for tool and die makers as well as machinists to produce a tool, fixture, jig, gage or die to specified limits of accuracy—to repeat precision work with assurance of interchangeability—to set and check measuring instruments to exact dimensions.

The ULTRA-CHEX set shown consists of 34 precision blocks which will make up about 80,000 combinations in steps of 1/10,000" from .300" up to 8". Price $125.00 f.o.b. New York. The optical flat supplied with this set is used for comparing various combinations for size and wear and also to check micrometer anvils for planeness and parallelism.

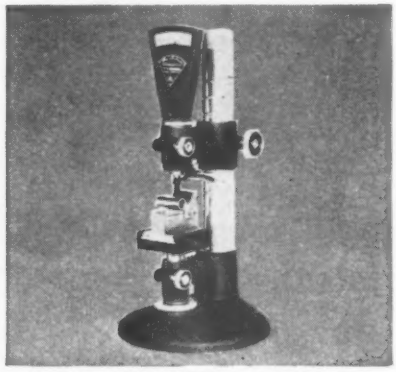
Ask for 8 page ULTRA-CHEX Bulletin. Sent promptly on request.

GEORGE SCHERR COMPANY, INC.
124 LAFAYETTE STREET • NEW YORK, N.Y.

OTHER INSTRUMENTS IN THE SCHERR LIMITED BUDGET INSPECTION LABORATORY

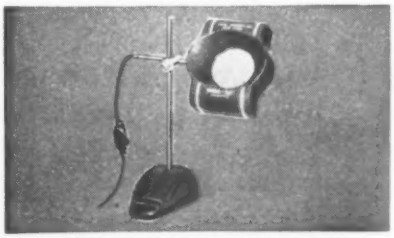


SPENCER BINOCULAR MICROSCOPE with 3 dimensional vision reveals surface finish, imperfections, etc.

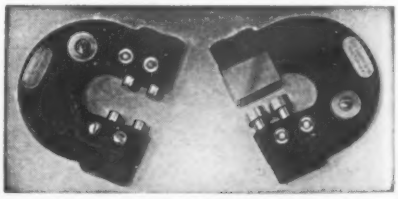


SCHERR COMPARITOL for checking gage blocks, gages and work for size, accuracy and wear.

WILDER PROJECTOR for accurate measuring or comparing objects by means of a magnified shadow image.



MAGNI-RAY—a wide-field illuminated magnifier for close inspection of work and operations.



ATLANTIC ADJUSTABLE LIMIT SNAP GAGES provide accurate checkup without having to depend on operator's skill. Sizes to 6".

HOW AND WHY

WILLIAMS' TOOLS AID WAR PRODUCTION

DATA ON "VULCAN" EYE BOLTS

● Eye Bolts are used extensively to facilitate the moving, installation and handling of machines, equipment, gigs, etc. Many designers place Eye Bolts at strategic locations on their machines to eliminate hazardous stresses that would cause torsional weave or misalignment of critical sections or surfaces. In addition to these common industrial uses, Eye Bolts are today widely used on such war equipment as guns, tanks and boats for lifting and towing purposes. Eye Bolt failure, in addition to endangering life, may cause damage to delicate or costly mechanisms. *Strength* and *Safety* are therefore the fundamental essentials of Eye Bolt design.

Williams' "Vulcan" Eye Bolts are weldless, being drop-forged from a solid blank of carbon steel. After forging they are heat-treated to further increase their strength and toughness and reduce liability of breakage. Every "Vulcan" Eye Bolt is then individually proof-tested on a standard tension machine to *fifty percent beyond* its rated "safe working load." Each Eye Bolt so tested and approved is stamped with the circular identifying mark shown in the illustration at left.

The following data is intended to help users in the selection of available standard patterns and sizes. These "Vulcan" Eye Bolts can be furnished blank, from stock. Plain and Shoulder Patterns are carried in stock threaded U. S. Std., but Miscellaneous Patterns must be threaded to order.

SHOULDER PATTERN "VULCAN"

No.	Shank: Diam.; Nominal Rough Size; Blank	Shank: Std. Lgth. under Shldr. Blank and Thd.	Shank: Maximum Lgth. in Stock; Blank	Eye, Diameter: Inside	Eye, Diameter: Outside	Capacity Blanks; Tons of 2000 lbs.: Safe Working Load	Capacity Blanks; Tons of 2000 lbs.: Breaking Strain, Apprx.
21	1/4	1	3	3/4	1 3/16	.2	1.5
22	5/16	1 1/8	4	7/8	1 7/16	.4	2.
23	3/8	1 1/4	4 1/2	1	1 21/32	.7	3.
24	7/16	1 3/8	4 1/2	1 3/32	1 27/32	1.	4.
25	1/2	1 1/2	4 1/2	1 3/16	2 1/16	1.3	5.
26	9/16	1 5/8	4 1/2	1 9/32	2 9/32	1.5	6.
27	5/8	1 3/4	4 1/2	1 3/8	2 1/2	2.	8.
28	3/4	2	5	1 1/2	2 13/16	3.	12.
29	7/8	2 1/4	5	1 11/16	3 1/4	3.5	16.
30	1	2 1/2	5	1 13/16	3 9/16	4.	20.
31	1 1/8	2 3/4	5	2	4	5.	23.
32	1 1/4	3	6	2 3/16	4 7/16	7.5	33.
34	1 1/2	3 1/2	6	2 1/2	5 3/16	9.	42.
35	1 3/4	3 3/4	6	2 7/8	6 1/16	11.	53.
36	2	4	6	3 1/4	6 7/8	13.	68.

PLAIN PATTERN "VULCAN"

No.	Shank: Diam.; Nominal Rough Size; Blank	Shank: Std. Length under Eye, Blank and Thd.	Shank: Maximum Length in Stock; Blank	Diameter Eye: Inside	Diameter Eye: Outside	Capacity Blanks; Tons of 2000 lbs.: Safe Working Load	Capacity Blanks; Tons of 2000 lbs.: Breaking Strain, Apprx.
3	3/8	1 1/4	4 1/2	1	1 21/32	.7	3.
4	7/16	1 3/8	4 1/2	1 3/32	1 27/32	1.	4.
5	1/2	1 1/2	4 1/2	1 3/16	2 1/16	1.3	5.
6	9/16	1 5/8	4 1/2	1 9/32	2 9/32	1.5	6.
7	5/8	1 3/4	4 1/2	1 3/8	2 1/2	2.	8.
8	3/4	2	5	1 1/2	2 13/16	3.	12.
9	7/8	2 1/4	5	1 11/16	3 1/4	3.5	16.
10	1	2 1/2	5	1 13/16	3 9/16	4.	20.
11	1 1/8	2 3/4	5	2	4	5.	23.
12	1 1/4	3	6	2 3/16	4 7/16	7.5	33.
14	1 1/2	3 1/2	6	2 1/2	5 3/16	9.	42
15	1 3/4	3 3/4	6	2 7/8	6 1/16	11.	53
16	2	4	6	3 1/4	6 7/8	13.	68
17	2 1/2	5	6	4	8 9/16	16.	85.

TYPE A TYPE B

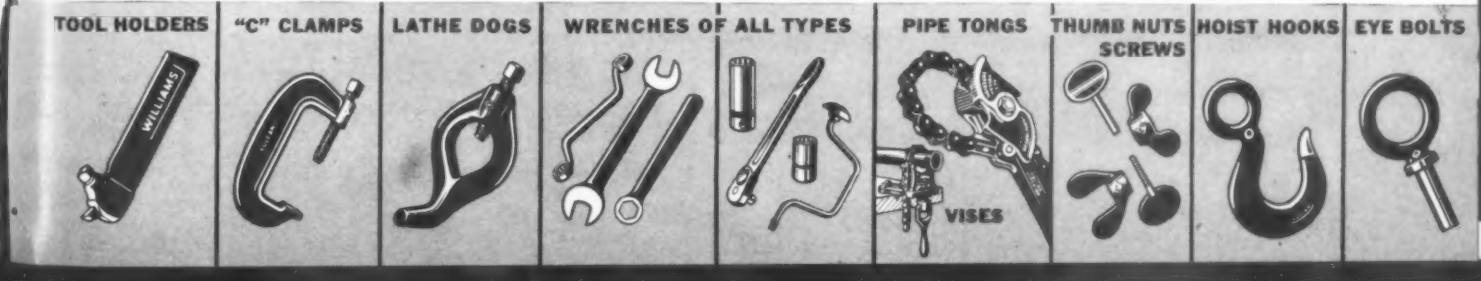
MISCELLANEOUS PATTERNS

These two styles are carried in stock blank (not threaded) in the following shank dimensions:

Type A, 1/4" x 3/4" to 1-1/16" x 4-1/8"
Type B, 1/4" x 1/2" to 1" x 2-3/4"

WILLIAMS
SUPERIOR DROP-FORGED TOOLS
Headquarters
for over half a century for
DROP-FORGINGS and DROP-FORGED TOOLS

Sold by Leading Industrial Distributors Everywhere . . . J. H. Williams & Co., Buffalo, N. Y.



Multiply the Value of Your Surface Grinders

Grind Your Own Broaches Rapidly and Accurately With a Liberty Vertical High Speed Grinding Attachment

Don't send broaches back to the manufacturer for sharpening. Save time—save money—with a Liberty Vertical mounted on your own surface grinder. It will grind the following broaches speedily and accurately. Keyway—Straight Tooth—Angular Tooth—Progressive (several types)—Rectangular—Square and others.

LIBERTY VERTICAL AND HORIZONTAL HIGH SPEED ATTACHMENTS

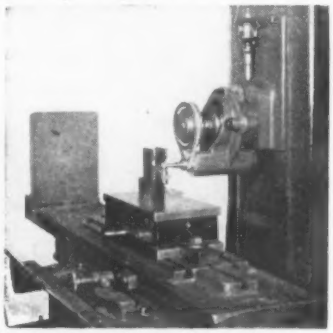
Two highly accurate, completely assembled units—each designed to perform a great variety of operations on all sorts of hard-to-get-at surfaces. Easily and quickly attached to Brown & Sharpe (old style only); Taft-Peirce; Reid; Hammond and other well known grinders—or any machine with a Pope, Excello or Parker spindle.

They Save Up to 30 Minutes in Set-up Time

Write for prices giving make and serial number of your grinder

LIBERTY HORIZONTAL ATTACHMENTS

Here shown grinding gaging seat on special gage. Libertys are precision built for precision work.



Certain territories are still open for sales representatives. Correspondence solicited.

LIBERTY TOOL & GAGE WORKS INC.
PROVIDENCE RHODE ISLAND

DON'T WAIT FOR TURRET LATHES

Convert any engine lathe into a turret lathe in 15 seconds, with JEFFERSON TURRET ATTACHMENTS. To fit bench lathes and lathes up to 24" swing.

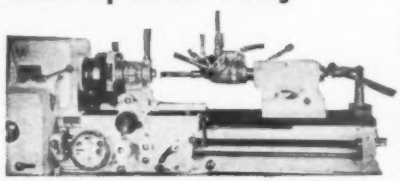
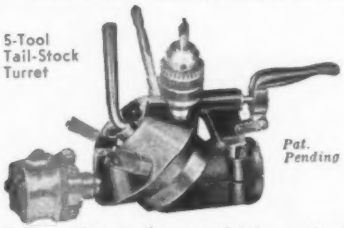


Photo Shows Turrets Applied to 16" Lathe

● This new modern TOOL-POST TURRET (below, right), made in 2 sizes, designed to increase production on engine lathes. Easily mounted on cross slide or compound rest. Has capacity of 4 standard tool holders which are easily inserted and rigidly held.

6 Days Delivery

5-Tool Tail-Stock Turret



Pat. Pending

Pat. Pending

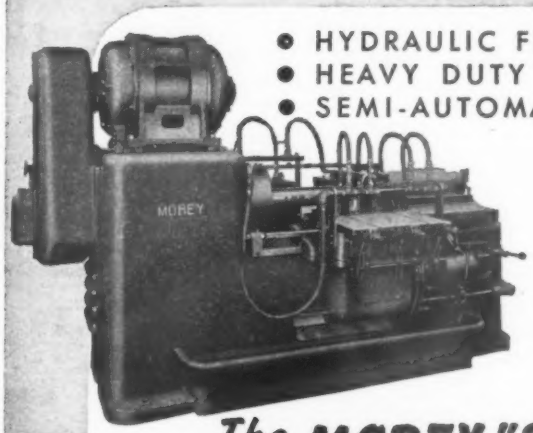
4-Tool Tool-Post Turret

● Then there's the completely modernized 5-tool TAIL-STOCK TURRET (above), made in 4 sizes to fit small bench lathes and lathes up to 24" swing. Also the adjustable PULL-FEED LEVER. Jefferson Turrets are real production tools—substantial, rigid, accurate. They must not be confused with the small make-shift gadgets now on the markets.

● *Also — Milling Machines, Milling Machine Dividing Heads, Vises, Belt Sanders, Swing Frame Grinders, Gyratory Foundry Riddles.*

JEFFERSON MACHINE TOOL CO.
SO. SWEENEY, CUTTER & FOURTH STS. CINCINNATI, OHIO

Suitable for 105 M.M. to 155 M.M. Shells



- HYDRAULIC FEED
- HEAVY DUTY
- SEMI-AUTOMATIC

The MOREY "27" SHELL LATHE

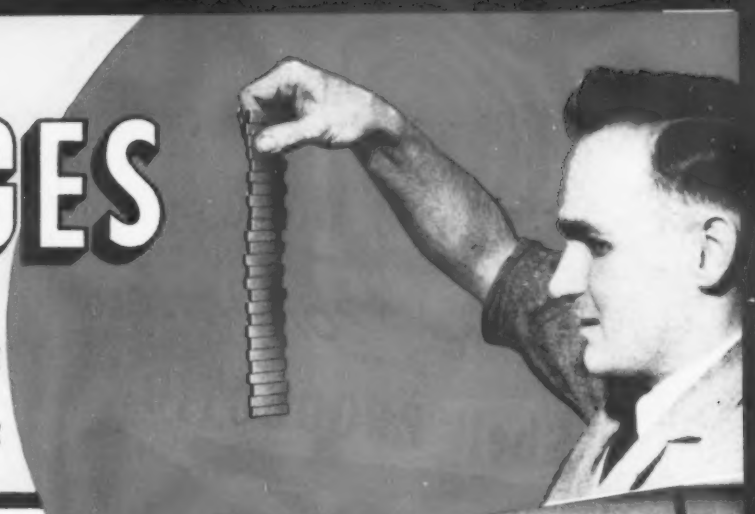
Timken Tapered Roller Bearings for Main Spindle — All Others Anti-Friction

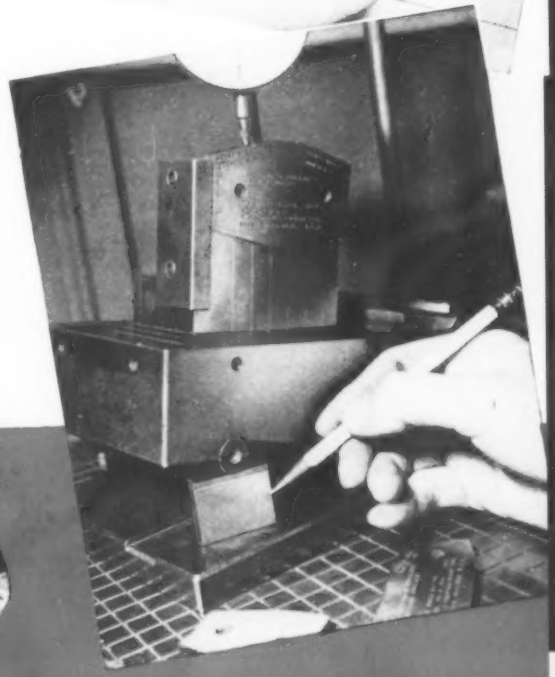
The HYDRAULIC FEED insures an almost effortless operation. Rigid enough to use carbide tools to their full capacity—entirely self-contained—no outside or auxiliary equipment required! Details in Circular 715—ask for it.

MOREY MACHINERY CO., INC
410 BROOME STREET • NEW YORK, N. Y.

DoAll GAGES

◆ *The Measure Blocks of a Thousand Uses*





Every manufacturer of armaments, metal parts, equipment or tools needs DoAll Gage Blocks to check dimensions for absolute accuracy at the source and along every step during production.

DON'T TAKE CHANCES ON ANY PRECISION TOOLING

Be sure of your gages! World War No. 2 is being fought with measurements ten times as accurate as before.

DoAll Gage Blocks are a "must" for your laboratory, tool room and inspection department. Why risk having a whole shipment or even a partial shipment of badly needed parts rejected because they do not interchange in a certain instrument or work smoothly enough?

America has no time to wait for re-runs. Every hour counts. Parts must be right the first time, and very right. Peacetime production will insist on today's tempo of tolerances, too.

DoAll Gage Blocks come in the following accuracies:

Working Set —Eight millionths of an inch	**$295.00**
Inspection Set —Four millionths of an inch	**350.00**
Laboratory Set—Two millionths of an inch	**Price on Application**

A room with temperature controlled at 68° is recommended for using this set.
Each set contains 81 gages

Write us immediately for complete data and good deliveries

SAVAGE TOOL COMPANY

Dept. AM, **Savage, Minn.**

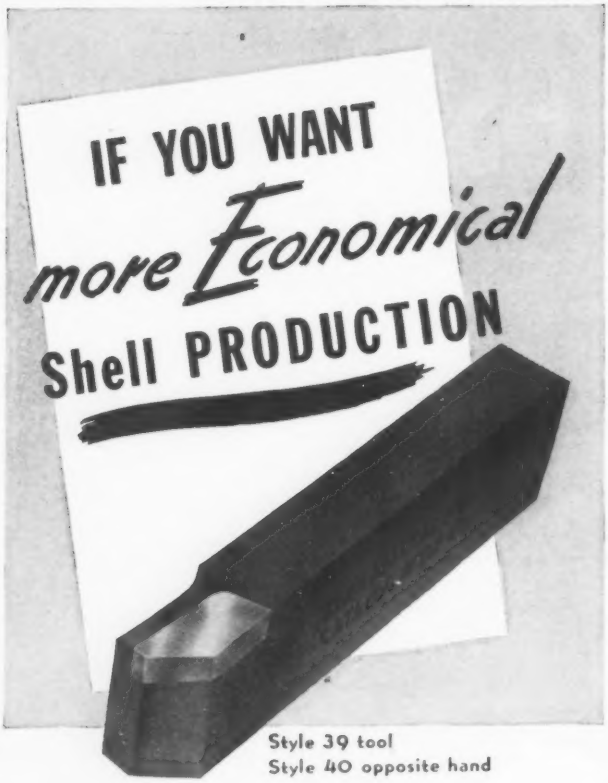
Local DoAll offices distribute Gage Blocks. They also sell and service DoAll Precision Surface Grinders and the equipment shown below. See your Telephone Directory for nearest DoAll office.

DoAll CONTOUR SAWING AND FILING MACHINES

Built by our associate company, Continental Machines, Inc., Minneapolis, Minn.

DoAll BAND SAWS

Made by our associate Company The DoAll Company, Des Plaines, Ill.



Style 39 tool
Style 40 opposite hand

USE THE

KENNAMETAL* Style 39 Tool

Design of the new "LEAD ANGLE" tool reduces Grinding Time

McKenna Metals Company answers the demand for a steel-cutting carbide tool having a large lead angle; Style 39 combines the large lead angle or side cutting edge angle with a tip longer than customary on carbide tipped tools to give greater tool life and permit more regrinds.

The time necessary to sharpen the tool is less than is needed to grind standard style tools since only the actual working portion of the side cutting edge is sharpened.

The large side cutting edge angle permits regrinding the cutting edges with a minimum of steel removal and grinding of chip breakers with no steel removal. The cutting load is lightened along the cutting edge since the chip is thinner for a given feed than it is for tools with a smaller SCEA.

These tools are being widely used on shell turning operations and wherever uniform forgings restrict the maximum depth of cut to the ground portion of the tip.

Style 39 is illustrated; style 40 is opposite hand. Secure these tools to ease the regrinding problem in your plant.

Write for the new KENNAMETAL TOOL MANUAL for information about the care and handling of KENNAMETAL TOOLS.

KENNAMETAL THE All America CARBIDE

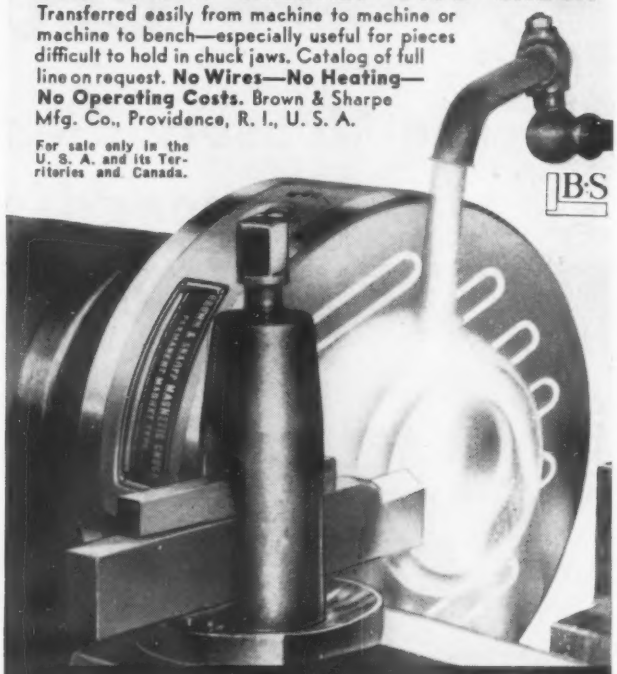
* INVENTED AND MANUFACTURED IN U.S.A.

McKENNA METALS Co.
103 LLOYD AVE., LATROBE, PA.
Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
Exclusive of Canada and Great Britain

SPEED UP LIGHT TURNING AS WELL AS GRINDING
with 9" ROTARY MODEL
PERMANENT MAGNET TYPE CHUCK

Transferred easily from machine to machine or machine to bench—especially useful for pieces difficult to hold in chuck jaws. Catalog of full line on request. **No Wires—No Heating—No Operating Costs.** Brown & Sharpe Mfg. Co., Providence, R. I., U. S. A.

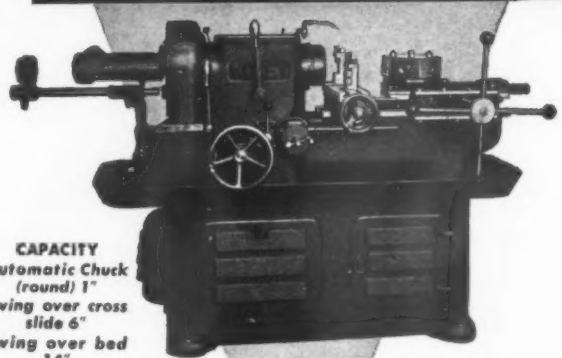
For sale only in the U. S. A. and its Territories and Canada.



BROWN & SHARPE

for ECONOMY—for HIGH SPEED PRODUCTION

The MOREY 2G
Back-Geared
TURRET LATHE
Timken Bearing
Self-Locking Turret and Infinite Spindle Speeds

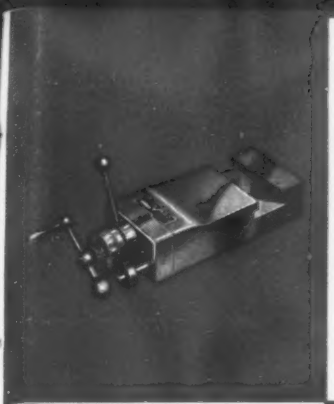


CAPACITY
Automatic Chuck (round) 1"
Swing over cross slide 6"
Swing over bed 14"

Thousands of the MOREY 2G Turret Lathes are saving money with no sacrifice of high speed production. Economy features: Back Gears are instantly thrown in through extra large Twin Disc Clutch—Full advantage from high speed and carbide tools—Vibrationless precision and an infinite variety of spindle speeds for every job—Timken bearing—Self-locking turret. Can be furnished with tooling.

Ask for Circular 629 for full details

MOREY MACHINERY CO., INC
410 BROOME STREET • NEW YORK, N. Y.

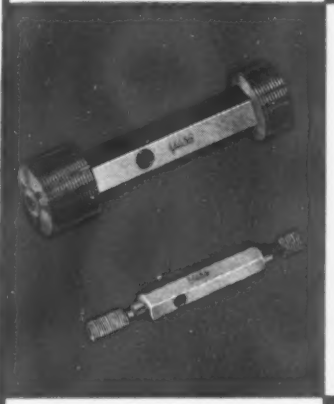


LATHE COMPOUND—For 10-inch South Bend. Quick drawout. Increases thread chasing output 40%.

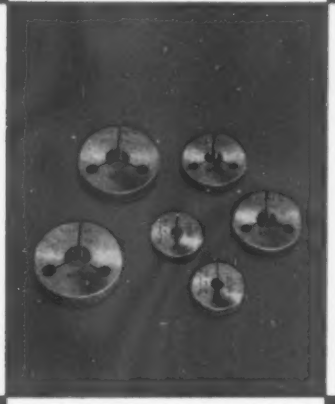
SNAP GAGE—Rapidly checks the pitch diameter, thread form angle, and lead of work under inspection.

CIRCULAR THREAD CHASER—Chases threads on lathe work more rapidly and accurately than single point tools.

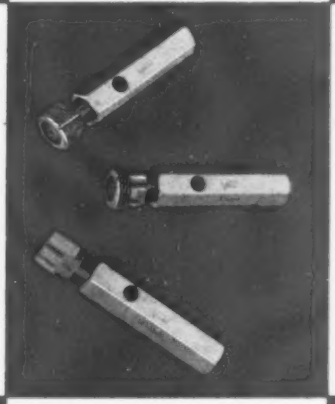
EXTERNAL COMPARATOR STAND—Rapidly checks outside diameters to close tolerances. Rugged.



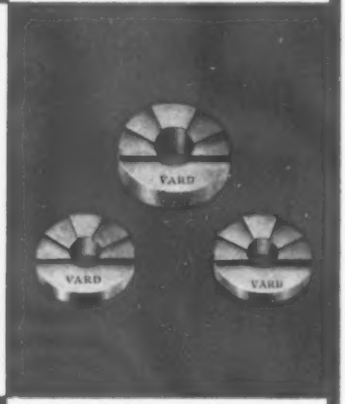
PLUG THREAD GAGES—Check pitch diameter and major diameter of internal threads. Made in all sizes from No. 4 to 6-in.



THREADED RING GAGES—Check the pitch diameter and thread form of external threads. Made in all sizes from No. 0 to 12-in.

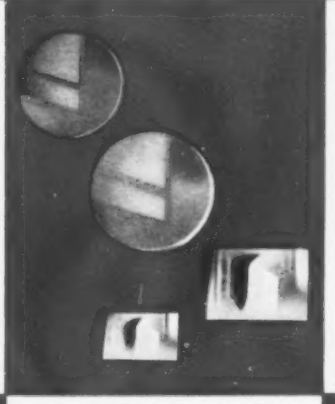


PIPE THREAD PLUG GAGES—Check thread form and truncation of N.P.T. internal pipe threads to Army-Navy specification

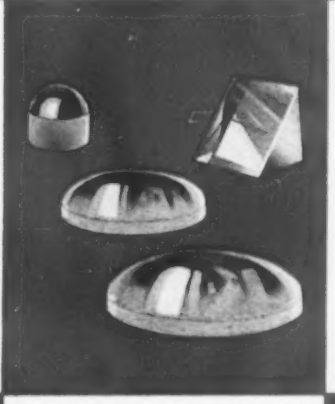


PLAIN TAPER, 6-STEP, PIPE THREAD GAGES—Check basic, maximum, and minimum tolerances of external pipe threads

OPTICAL FLATS—Precision made for testing flat surfaces and anvils on testing instruments.



FILTERS AND MIRRORS—Color filters for visual and photographic uses. High reflectivity mirrors.



LENSES AND PRISMS—Precision lenses and prisms for fire control, navigation, and other instruments.

OPTICOTE—Durable films applied to glass to reduce reflection and increase light transmission.

TWO-PIECE TAPS—Made in larger than usual sizes to conserve high speed steel. Mild steel shank.

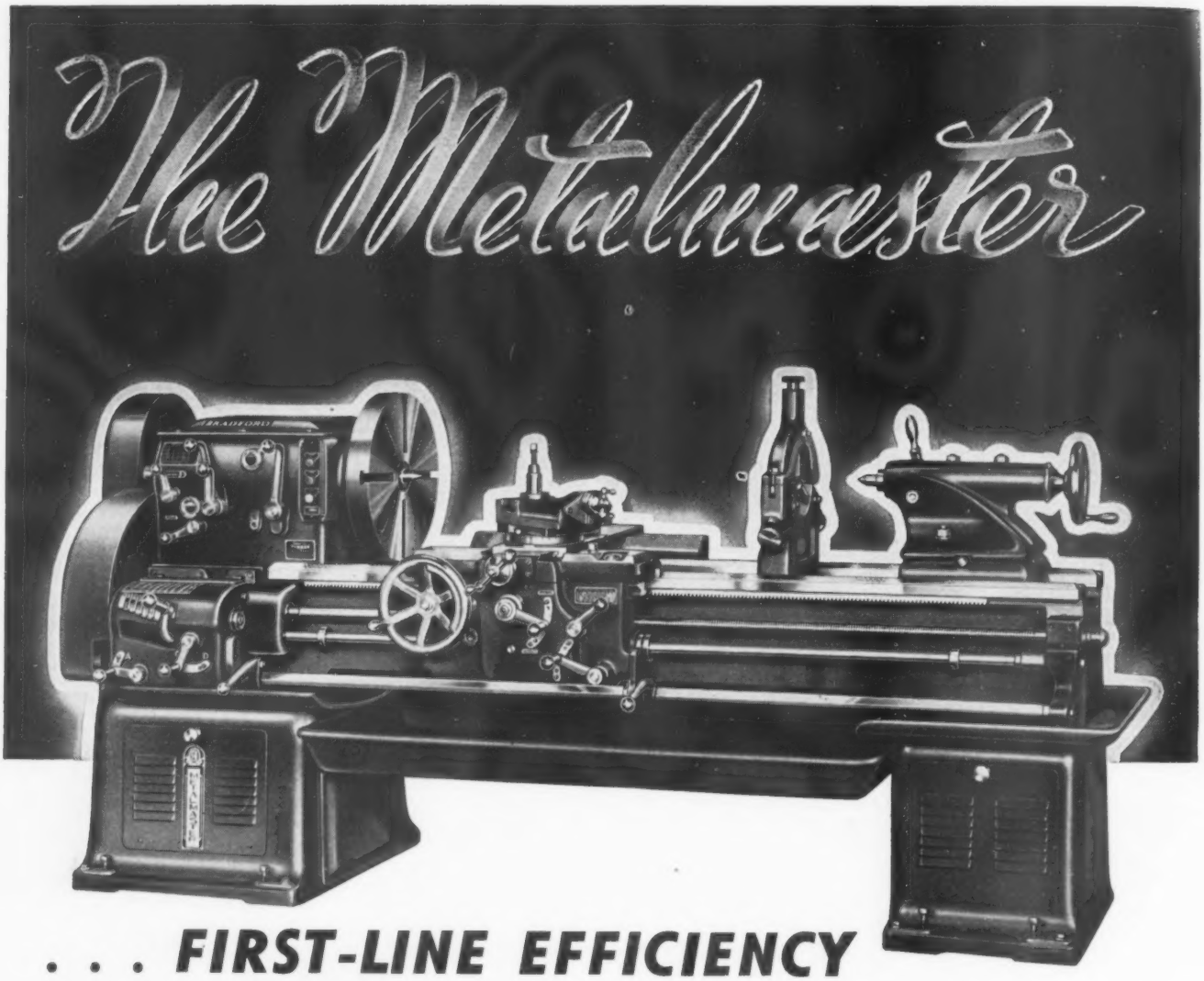
SPECIAL TAPS—Precision ground to narrow limits. Available also in special and left-hand threads.

THESE TOOLS OF PEACE ARE MAKING THE WEAPONS OF WAR

Here are some of the VARD precision-made inspection and production tools which in hundreds of war factories are turning out accurate, difficult work, quickly and efficiently. ALL VARD products conform to prevailing technical standards, and represent the best in design, materials, and workmanship.

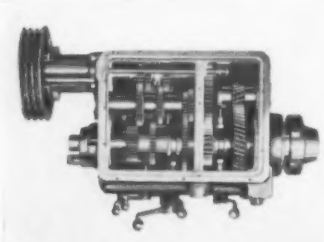
VARD INC. PASADENA, CALIFORNIA

The Metalmaster



. . . FIRST-LINE EFFICIENCY FOR FRONT-LINE PRODUCTION

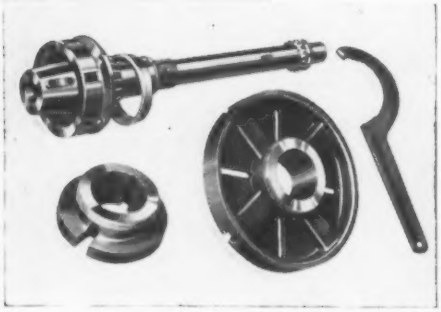
To meet war-time demands for fast, precision production plus economy and ease of operation . . . look to the METAL-MASTER! Every point assures superior all-round performance. For example:



HEADSTOCK—Heavy walls, sturdy center bracing, twelve spindle speeds, both forward and reverse, gears—alloy steel, conveniently located shift handles.

SPINDLE—Machined from solid high-carbon molybdenum steel forgings, bored straight through from end to end. Large precision tapered roller bearings. Chucks and face plates are drawn back securely by a locking ring—driven by a large key.

SMOOTH, POWERFUL DRIVE—"V" belts insure quiet efficient power. Multiple disc clutch, completely oil immersed. Jogging, with motor running at high speed, is entirey possible. Completely adjustable clutch and brake. Drive sheave is mounted on precision-tapered roller bearings.



Solve those knotty production problems with the METALMASTER! Write—we'll furnish complete catalogs explaining the METALMASTER in detail.

The BRADFORD MACHINE TOOL Co

MANUFACTURERS OF METAL WORKING LATHES; CAM FEED DRILLING AND TAPPING EQUIPMENT, HYDRAULIC DRILLING MACHINES . . . IN BUSINESS SINCE 1840

659 EVANS AVE. . . . CINCINNATI, OHIO

HOW THE *New*

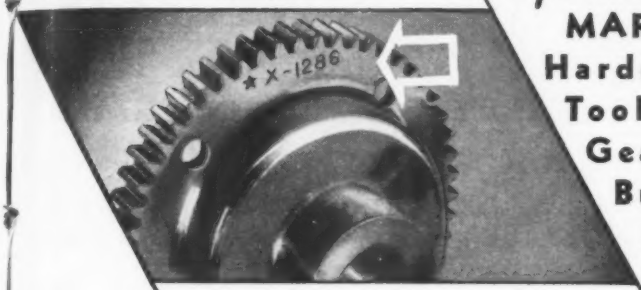
GORTON SPIT-FIRE ARC ETCHER

• • • —

Speeds **PERMANENT MARKING OF Hardened Parts Tools, Gages Gears, Rods Bushings Collets etc.**

FOR CYLINDERS, etc. — Etching inside cylinders, cavities, cones, etc.

FOR V-BLOCKS, etc.— Etching both sides of a V, and in most inaccessible places.

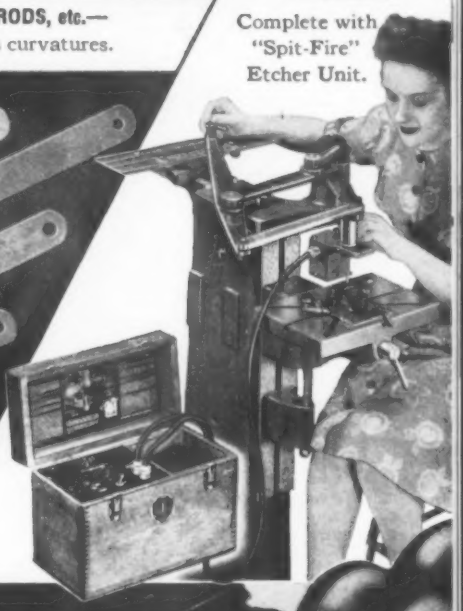


FOR GEARS, etc.— Highly polished or ground parts, hardened pins, etc.

FOR CONNECTING RODS, etc.— Automatically follows curvatures.

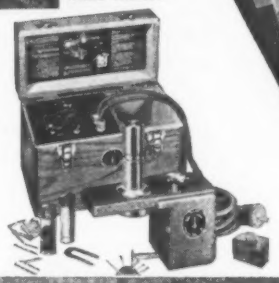
MODEL A-E ETCHING MACHINE

Complete with "Spit-Fire" Etcher Unit.



***PORTABLE* ETCHER UNIT**

FITS standard Gorton Engraving Machines. For other makes, consult factory, state make.



FOR GAGES — Highly efficient on delicate parts, such as .0015" thin feeler gage stock, and on an endless variety of sizes and shapes.

PRESENT DELIVERIES 2 to 4 WEEKS

Precision Etches

240 BALL SOCKETS EVERY 60 MINUTES

Every 15 seconds the Gorton "Spit-Fire" electrically etches these ball sockets — Accurately . . . Legibly . . . Permanently.

For Accurate

HIGH PRODUCTION ETCHING

Deeply Etches Hardened Parts without Burr

MARKS GOODS IN FINISHED STATE—Most efficient on highly polished or ground surfaces, large or small.

PERMANENTLY ETCHES — LIGHT OR DEEP — from .0001" to .003" deep, and from .0075" to .015" wide, on soft to hard metals, including hardest steels—*Any Shape*, on flat or irregular surfaces — without Forming Guide.

SIMPLE OPERATION—QUICK SET-UPS—Uses unskilled operator. Requires no acid, no pressure. Operates on 110 to 120 volts, 60 cycles AC only.

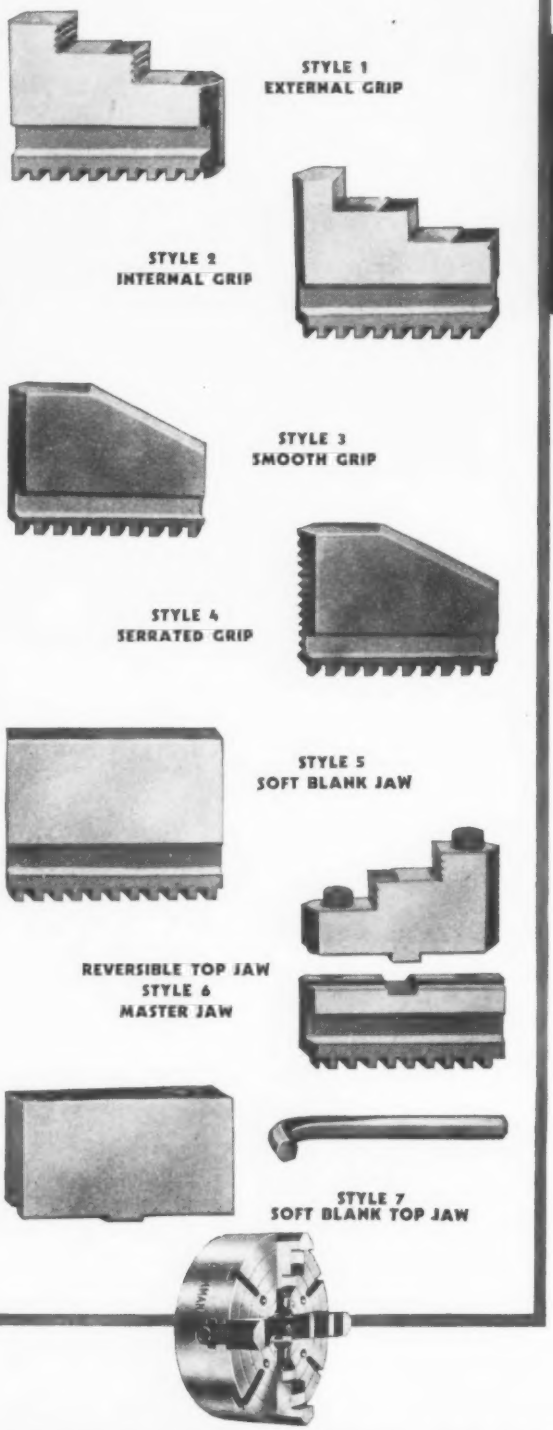
FOR FULL DETAILS WRITE FOR FREE BULLETIN 1635-A

GEORGE GORTON MACHINE CO.

50 Years

1315 RACINE STREET, RACINE, WISCONSIN, U. S. A.

SPECIALISTS IN ENGRAVING, DIE MAKING AND SUPER-SPEED VERTICAL MILLING



know these jaws

CORRECT JAW SELECTION AND USE MAKES SET-UP EASIER, FASTER . . . SAFEGUARDS EQUIPMENT, WORK

Let's not make the mistake, these days, of thinking that what is "old stuff" to us is equally familiar to the man or girl at the next bench.

Take this matter of Chuck Jaws, for example, sure, everybody knows what a Chuck jaw is... and how to hook 'em up. And yet we have plenty of trouble with people who *don't* use the right jaws in the right way, and thus cause themselves needless waste of time, material and rejected work.

So here is a brief description of the principal types of lathe chuck jaws and what they are used for. Just call it to the attention of your training director and the newer people in your shop. Might show it to some of the "old hands" too. Reprints can be furnished gratis on request.

STYLE 1 For holding work on external surfaces. Designed for holding forgings and castings on the O. D.

STYLE 2 For holding rings or tubular shaped pieces on the I. D. Also for holding bars or rods within capacity of body center.

STYLE 3 Commonly used on chucks holding arbors etc. Standard jaw equipment for milling machine tooling.

STYLE 4 Commonly used for holding rough bar stock with extra work grip to prevent slippage on roughing cuts.

STYLE 5 Commonly used soft and formed to properly engage work pieces of irregular contour or outline. Also used for 2nd operation work to provide soft gripping bites to prevent marring of work surfaces.

STYLE 6 Master Jaws Designed to American standard dimensions to permit interchange of top jaws from one chuck to another. The design permits mounting of special top jaws of irregular or standard forms providing widest possible range of work-holding equipment.

STYLE 7 Used in the same manner as Style 5 on chucks equipped with Style 6 master jaws.

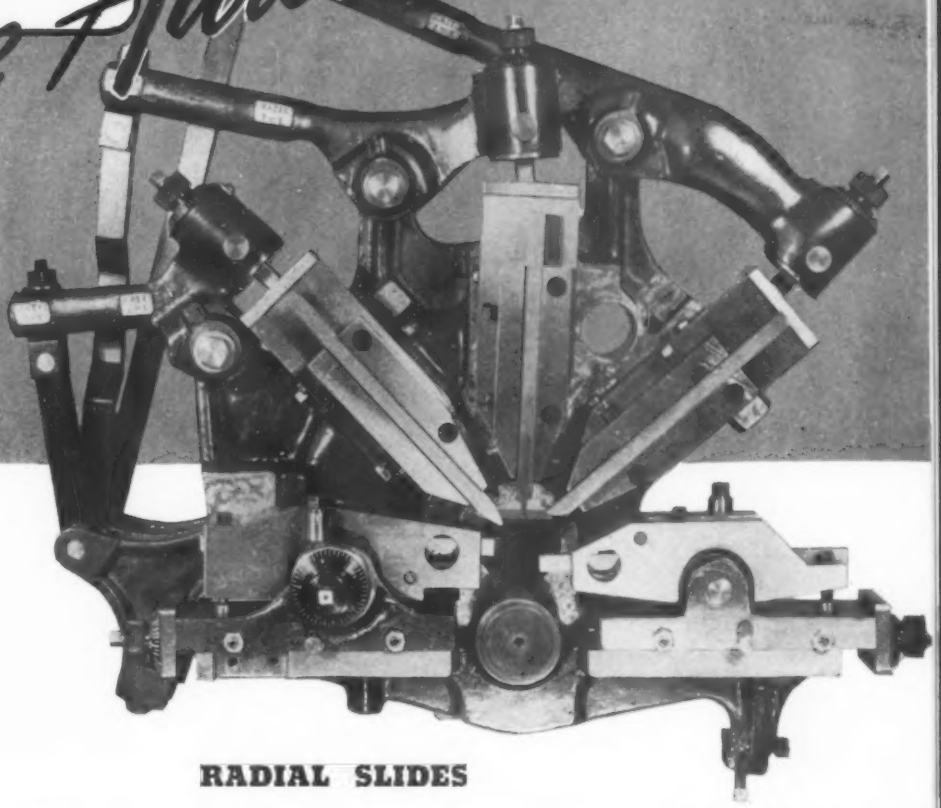
These "Chuck Check" cards, giving the 6 most important rules of good chuck practice are available for distribution to your operators. Write us.

The Cushman Chuck Company, Hartford, Connecticut.

CUSHMAN

A World Standard for PRECISION

CECO *Swiss Type Automatics*



Here are a few pieces we have made from bar stock in **ONE** *operation*

RADIAL SLIDES

This universal, Swiss Type, precision machine uses very simple and very inexpensive standard tool bits in place of the conventional indexing turrets, box tools and form tools. These tool bits turn and face the work as the revolving bar stock is being fed forward through the work guide bushing just back of the bits. This guide bushing does the work of the steady rest on a tool room engine lathe, assuring concentricity. ★ The bits are advanced radially to the work and are receded when not in use by means of flat cams mounted on a single camshaft located at the back of the machine. ★ Accuracy of diameters and lengths of shoulders are maintained by means of double micrometer adjustments. Odd shapes, such as radii, complicated forms, and tapers, can be produced by generating the flat cams mounted on the camshaft. Drilling, reaming, counterboring, tapping, threading, etc., are accomplished by attachments mounted on end of machine.

4 SLIDE—Above machine has four radial tool slides with bar capacity of ⅜" diameter and a turning length of 1½" with flat cam and 2¾" with bell cam, and infinitely variable spindle speeds ranging from 675 to 6100.

5 SLIDE—Above machine has five radial tool slides with bar capacity of either ⅜" or ½" with a turning length of 4" with flat cam, and infinitely variable spindle speeds ranging from 755-7500.

THE CITY ENGINEERING CO.

Dayton, Ohio

"BOOTS! BOOTS! BOOTS!

. . . there is no discharge in the war"

(apologies to Rudyard Kipling)

FORD CHAIN BLOCKS, whether **TRIBLOCS, SCREW HOISTS** or **DIFFERENTIAL HOISTS** are rapidly, efficiently, and economically keeping their war loads "going up and down again." **FORD CHAIN BLOCKS** are sturdy mechanical soldiers in this war for freedom against tyranny—and as such deserve the consideration given all soldiers. They should not be overtaxed; they should not be weakened by overload; they should have a regular "ration" of lubricant. Here are five ways to make your **FORD CHAIN BLOCKS** last longer and do better work.

- The gear cover should be removed occasionally and a small quantity of heavy graphite grease applied to gear train.
- The load chain should be cleaned and lubricated frequently with a heavy oil, particularly at engaging points of links.
- Load sheaves should also be greased.
- Oil the bearings frequently so that no bearing will run dry and cause excessive wear.
- Oil holes are provided in the **TRIBLOC** at vital points. These should be used frequently.

When given intelligent care, thoroughly cleaned and lubricated at intervals, **FORD TRIBLOCS** will remain efficient under the hardest usage for a long time. Your **FORD HOIST** can be one of your best friends during this production emergency. Take care of it.

Order from Your Distributor

FORD CHAIN BLOCK DIVISION
Philadelphia, Chicago, San Francisco

AMERICAN CHAIN & CABLE COMPANY, Inc.
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F. F. GILMORE & CO.

DIAMOND TOOL MANUFACTURERS

In New Factory Headquarters

at 285 COLUMBUS AVE. BOSTON

Increased Diamond cutting and Tool making facilities now meet the greater production called for by our customers.

High Quality Diamond Tool products and War Production service are now extended to other manufacturers.

F. F. GILMORE & CO.
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PRODUCTION GOES UP . . . COSTS COME DOWN

THIS improved grinder speeds production in war plants throughout the country. Simplex-M eliminates costly hand emerying and filing. Assures straight grain, sharp edged finish. Variety of sizes and styles.

Informative Booklet on Finishing Free

WALLS SALES CORP., 96 Warren St., N. Y. C.

SIMPLEX-M ABRASIVE BAND GRINDER

LUERS

Patented Cut Off Tool Holders
Patented Cut Off Blades : : :

MANUFACTURED BY

12 Pine Street · J. MILTON LUERS · Mt. Clemens, Mich.

Produced under License Issued by John Milton Luers Patents Inc.

SCHAUER SPEED LATHES

. . . *Speed Production*

Performs *faster* finishing operations . . . relieves more expensive machinery of this work.

VAIE

With hand and foot operated mechanism . . . completely automatic . . . air operated . . . variable spindle speeds . . . vacuum holding fixtures. *Write for Catalog #420.*

NAIC

"The originators of today's Speed Lathes"

SCHAUER MACHINE COMPANY
2067 Reading Road Cincinnati, Ohio

Turning Time Reduced...

...FROM 17 MINUTES TO 7 MINUTES
on Aircraft Engine Parts

Nine different sizes of these airplane propeller shaft sleeves, each requiring a different set-up, are turned on this Sundstrand Automatic Lathe. Lots are relatively small, only 200. Yet, with the quick cycle set-up, a feature of this machine, short run work requiring different set-ups is practical and productive.

SET-UP CHANGE-OVER IN LESS THAN 30 MINUTES is possible for most operations on Sundstrand Automatic Lathes. With this feature you obtain the advantages of a fast automatic operating cycle, high rapid traverse rate of 250″ per minute and multiple tooling for your *short run work.*

EASY TO OPERATE...unskilled help can consistently produce work at close limits with a Sundstrand Lathe. The operator merely changes work pieces and starts the automatic cycle. Usually one operator can handle two or more machines.

Consider these features of the Sundstrand Automatic Lathe for your short run work before investing in slower general purpose equipment. It is available in 3 models.

QUICKER SET-UPS FOR SHORT RUNS

• Sundstrand Automatic Lathes run on cycles of rapid approach, feed, quick return of 250″ a minute. These are set up quickly and changed over easily by adjusting dogs on a graduated disc, as indicated above. No cycle control cams required.

HOW SUNDSTRAND ENGINEERED PRODUCTION CAN HELP YOU PRODUCE MORE

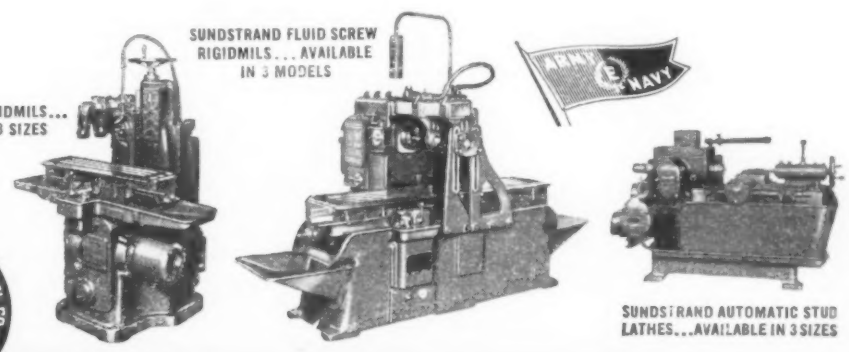
Sundstrand engineers are available to make recommendations on productive machining. Having wide experience in milling and turning makes it possible for them to suggest changes which increase production...lower cost. Use this service freely. Send complete information with inquiry.

HOW TO TURN SHORT RUN WORK FASTER

is illustrated in this booklet describing Sundstrand Automatic Lathes. Twenty-two front and six rear carriage cycle diagrams are also illustrated. Write for your copy today. Ask for Bulletin 109.

SUNDSTRAND RIGIDMILLS... AVAILABLE IN 3 SIZES

SUNDSTRAND FLUID SCREW RIGIDMILS... AVAILABLE IN 3 MODELS



SUNDSTRAND AUTOMATIC STUD LATHES...AVAILABLE IN 3 SIZES

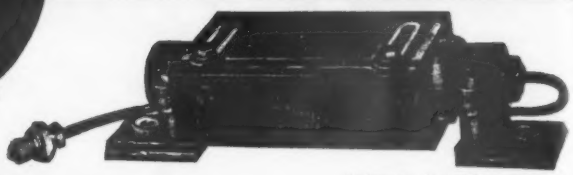
SUNDSTRAND MACHINE TOOL CO. · ROCKFORD, ILLINOIS, U.S.A. ·

SUNDSTRAND MACHINE TOOL CO.

2533 ELEVENTH ST., ROCKFORD, ILLINOIS, U. S. A.

Select your magnetic chucks . . . from the

COMPLETE WALKER LINE



Universal Swivelling Magnetic Chuck for Tool Room

Standard units for practically any service requirement are available from Walker because of the completeness and diversity of the Walker line.

Recognized everywhere for their efficiency and economy in holding work on a wide variety of operations. Walker Magnetic Chucks will help you speed up and cut costs of grinding, milling planing and turning. If you require special designs, Walker can furnish them.

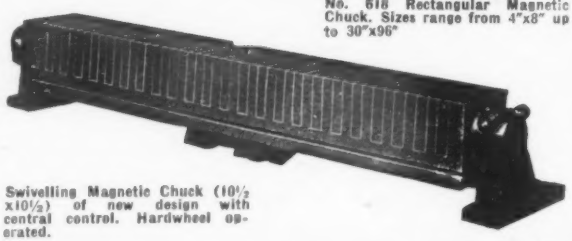
When you come to Walker, you come to specialists having more than thirty-five years experience in the development, design and manufacture of high quality, magnetic chucks of proved performance.

Walker offers a complete range of sizes in Rectangular, Swivelling, Vertical Face and Rotary types.

Our illustrated bulletin W4 contains valuable information for user of magnetic chucks. Write today. Ask Walker engineers to help you select the chuck you need for your specific service.

No. 618 Rectangular Magnetic Chuck. Sizes range from 4"x8" up to 30"x96"

Style D Face Plate. "Concentric Gap" Type



Swivelling Magnetic Chuck (10½ x10½) of new design with central control. Hardwheel operated.

Have you the WALKER CATALOG

O. S. WALKER COMPANY INC.

WORCESTER, MASS.

Immediate Delivery From Stock

Precision Collets and Drawbars

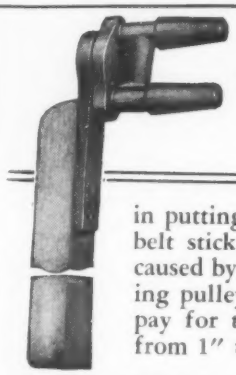
For ATLAS and LOGAN 10" LATHES

● Also available—9" South Bend Drawbars, and Collets for Logan Turret Lathe (Same as W&S No. 1). *Ready March 15th:* Collets 3C, 1A, 5C fitting South Bend Lathes, etc.

● Guaranteed unconditionally. Precision products are sold by dealers in the United States and Canada. *Literature on request.*

GENERAL DIE-STAMPING-TOOL COMPANY

PRECISION COLLET CO. DIVISION • 265 Canal St., New York City



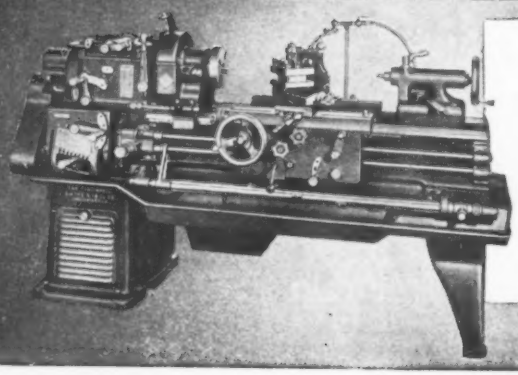
"Safety First"...

in putting belts on moving pulleys. This belt stick attachment prevents accidents caused by throwing belts on and off moving pulleys. Avoid accidents rather than pay for them. Two sizes to cover belts from 1" to 4".

THE READY TOOL COMPANY

IRANISTAN & R. R. AVES., BRIDGEPORT, CONN.

CINCINNATI LATHES



CINCINNATI LATHES
Accurate in Every Detail

Gears — precision cut, tempered and ground . . . Spindle — mounted on Roller Bearings to resist any combination of thrusts . . . Bed—extra heavy in construction . . . Ways and carriage hand scraped to a precision bearing. These features of Cincinnati Lathes add up to accuracy in every detail that insures precision results on every job. Write for complete specifications on 14" to 30" sizes to produce your work always most economically.

THE CINCINNATI LATHE & TOOL CO.

Rogers Road, Oakley SPECIALISTS SINCE 1906 Cincinnati, Ohio

This part produced in ONE forming cut by the

OSTER NO. 601

"RAPIDUCTION" TURRET LATHE

The part illustrated is one of numerous examples of heavy forming cuts obtained with the SIMPLIFIED Oster No. 601 "RAPIDUCTION" Turret Lathe, equipped with WORM DRIVE.

The hardened and ground steel worm, like the spindle, is mounted in ball bearings. A smooth, even flow of power is transmitted through a bronze worm wheel to the spindle. This smooth flow of power makes possible exceptionally heavy forming cuts with absence of chatter. (For high speed work on small diameters and non-ferrous materials, a DIRECT DRIVE is provided. Spindle speeds up to 3000 R. P. M. are obtained.)

The 6-station turret is now equipped with AUTOMATIC INDEXING. Price of complete machine is unchanged (Under $2000 without tools, F. O. B. Factory). The form below offers a convenient way to obtain full details QUICKLY. *Use it!*

No Time Out to Celebrate Our 50th ANNIVERSARY 1893-1943

OSTER

THE OSTER MFG. CO., 2049 E. 61st ST., CLEVELAND, OHIO, U. S. A.

★ O.K. Oster. We're interested in the No. 601 machine. ( ) Send Catalog No. 601. ( ) Ask your nearest distributor to see us at once. (Check either or both of above requests.)

NAME .....

ADDRESS .....

CITY ..... STATE .....

Aim this

at threats to stud setting speed and efficiency!

HERE's an Apex stud setter of brand new design, with the smallest O.D. we know of. It works close to shoulders, projections, etc., drives easily and accurately in tight spots normally hard-to-reach. Proves to be a simple, effective tool for either hand or power operation. *Important:* It's an ideal tool for "green" hands. It's easy to adjust, and once set for desired length of thread on stud, *stays adjusted.*

Four sizes supplied for studs up to 1¼" in diameter. Your choice of Morse taper shanks, hex drive, T-handle combination with female square for torque wrench.

Stud setters are only one branch of the Apex family of fine production tools. Write for any of these catalogs listed below.

Chuck and tool holders: Catalog No. 14; Power bits and hand drivers for Phillips screws: Catalog No. 15; Power bits for slotted head screws: Catalog No. 16; Power bits and hand drivers for clutch head screws: Catalog No. 17; Stud setters: Catalog No. 101.

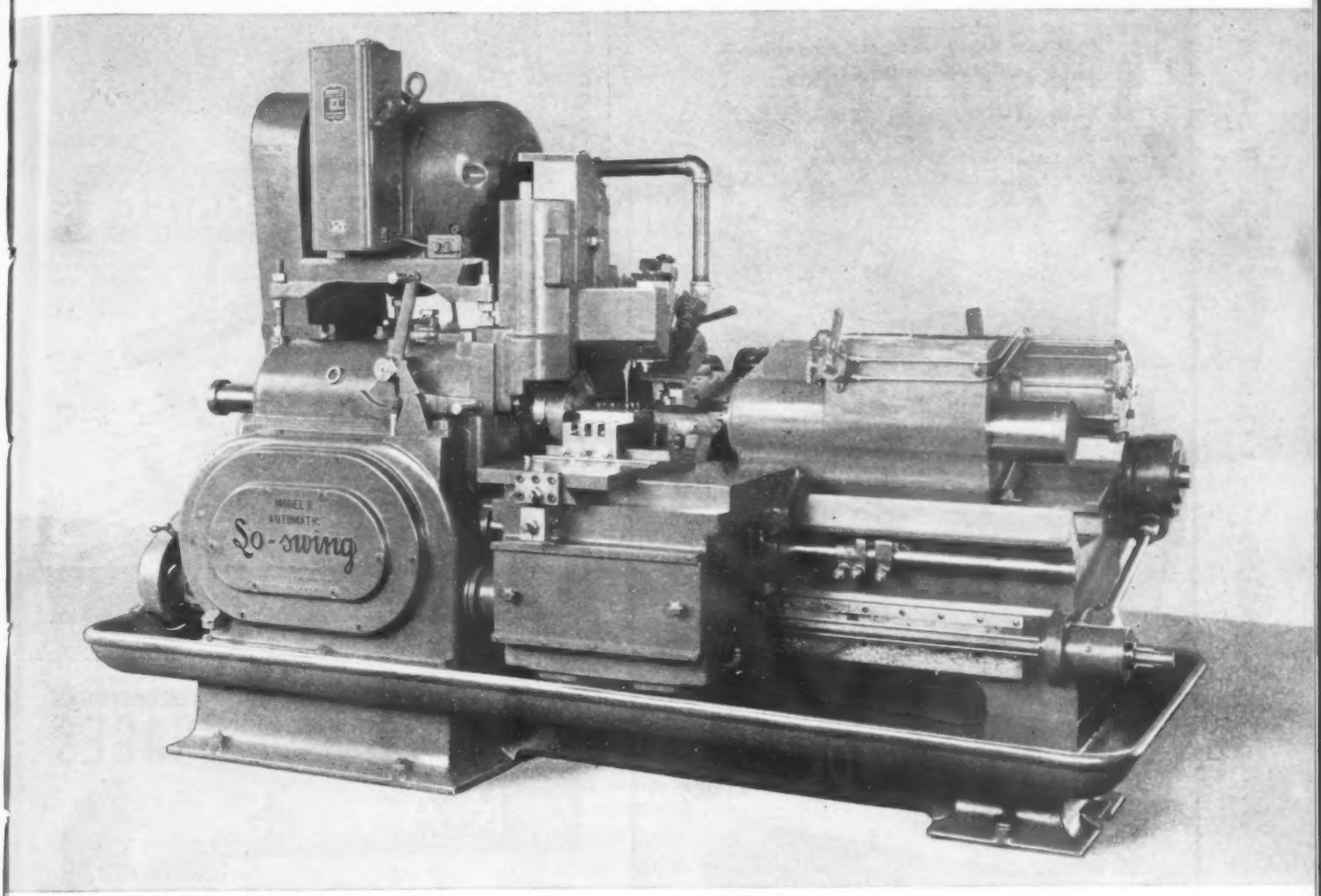
APEX

THE APEX MACHINE & TOOL CO., DAYTON. OHIO

Manufacturers of Safety Friction Tapping Chucks, Quick Change and Positive Drive Dri.. Chucks, Vertical Float Tapping Chucks, Parallel Floating Tool Holders, Power Bits for Phillips, Slotted Head and Clutch Head Screws, Hand Drivers for Phillips and Clutch Head Screws, Aircraft Universal Joints, Plain and Universal Joint Socket Wrenches.

MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. **"THE *Lo-swing* PEOPLE"** SENECA FALLS, NEW YORK



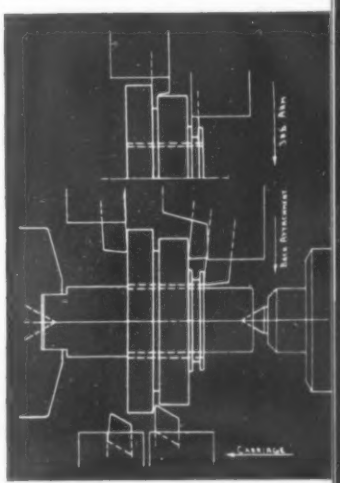
HEAVY TRACTOR GEARS, IN A WIDE VARIETY OF SIZES, ARE TURNED, FACED AND GROOVED ON A SINGLE MODEL R-14 *Lo-swing* LATHE

Problem: To provide a single automatic lathe capable of turning, facing and grooving a variety of sizes of heavy steel gears and requiring minimum change-over time from job to job.

Solution: The R-14 *Lo-swing* Lathe was chosen for this job primarily because it had the power and capacity necessary to handle heavy steel gears, varying in size from 4¾ to approximately 10" diameter. The built-in, Quick Change-over Mechanism on this lathe also provided a simple and speedy means for varying the carriage stroke, as required for each individual gear job.

Forged gear blanks come to the lathe with only the hole finished. Drive is by arbor through this hole as seen in the drawing opposite which illustrates typical tooling for one of the gears.

In order to simplify tooling, this Model R-14 *Lo-swing* was equipped with a standard Third Slide or Overarm which carries the grooving tools. Turning is accomplished with the Front Carriage tools while tools on the Back Attachment face the sides of the gears.



LATHE NEWS from SENECA FALLS

TUNGSTEN
CARBIDE TIPPED TOOLS
Price $1.00 Each In Any Size

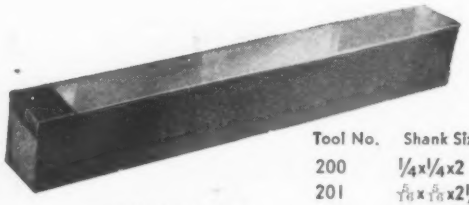
New Low Prices—Increase Production—
Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials such as hard rubber, bakelite, fibre, and tough alloy steels up to 500 Brinell hardness

Left Hand-Reverse Image. Right Hand Shown

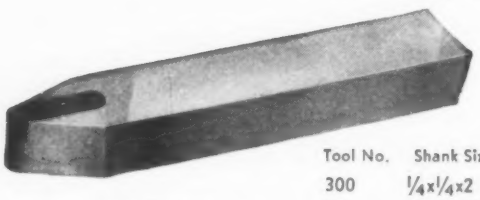
SERIES 100

Tool No. RH	LH	Shank Size
R-100	L-100	1/4x1/4x2
R-101	L-102	5/16x5/16x2 1/4
R-103	L-104	3/8x3/8x2 1/2
R-105	L-106	7/16x7/16x3
R-107	L-108	1/2x1/2x3 1/2



SERIES 200

Tool No.	Shank Size
200	1/4x1/4x2
201	5/16x5/16x2 1/4
202	3/8x3/8x2 1/2
203	7/16x7/16x3
204	1/2x1/2x3 1/2



SERIES 300

Tool No.	Shank Size
300	1/4x1/4x2
301	5/16x5/16x2 1/2
302	3/8x3/8x2 1/2
303	1/2x1/2x3 1/2

Standard Tungsten Carbide Tipped Tool Bits

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lots of 50 assorted 20% discount will be allowed.

Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

WE CARRY SILICON CARBIDE EMERY WHEELS FOR GRINDING TUNGSTEN CARBIDE TOOL BITS

Send for our latest circulars

VICTOR MACHINERY EXCHANGE, Inc.
251 CENTER STREET NEW YORK, N. Y.

a complete line of *Permanently Accurate*

Torque Wrenches

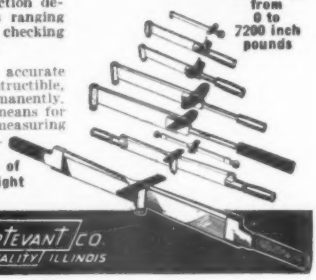
NO FRICTION ADJUSTMENTS MOVING PARTS FRAGILE MECHANISMS

STURTEVANT

Torque Wrenches are used in leading industrial, automotive and aircraft plants to control the set of screws and nuts in production departments . . . to measure and test applied torque or resistance in laboratories and inspection departments — and for innumerable jobs ranging from building delicate instruments to checking frictional drag in giant diesel motors.

SIZES — Capacities from 0 to 7200 inch pounds

Built by the pioneer manufacturer of accurate measuring wrenches. Practically indestructible, they retain their extreme accuracy permanently. They have brought to industry a new means for production control and for gauging and measuring torque in its thousands of applications.



Write for Bulletin describing use of STURTEVANT Wrenches at Wright Aeronautical Co.

P.A. STURTEVANT CO.
ADDISON QUALITY ILLINOIS

Carbide and Diamond-tipped
GAGES AND TOOLS
GUARANTEED QUALITY

ARTHUR A. *Crafts* COMPANY, INC.
Chicago 532 COMMONWEALTH AVE. *Detroit*
Boston

TORNADO Electric Writing Tool. Used for marking everything. Easily portable.

TORNADO Electric Writing Tools and Etchers

Protect Valuable Tools!

TORNADO Electric Writing Tools and Etchers mark everything of value that might be lost, misplaced or stolen. TORNADO Writing Tool marks brass, marble, tile, glass, plastics, wood, hard rubber, aluminum, steel and bronze.

TORNADO Electric Etcher marks iron, steel and steel alloy products. Burns permanent identification on various types of tools, dies, gauges, plates, gears, etc. Protects your valuable tools and other portable equipment!

Write for complete details

BREUER ELECTRIC MFG. CO.
5084 N. Rovenswood Ave., Chicago

Thanks to the

SUNNEN PRECISION HONING MACHINE

GIRLS IN 'TEENS

are handling jobs in "tenths"!

Aluminum Aircraft Link "produces high finish without bell-mouthing."

Inner Bearing Ring "Accurately removes last 'tenth' of stock."

Bronze Valve. The Sunnen method of honing is used to secure a high finish and accuracy.

Cones for Wheel Balancing Machine "Accurately align hones two interrupted surfaces."

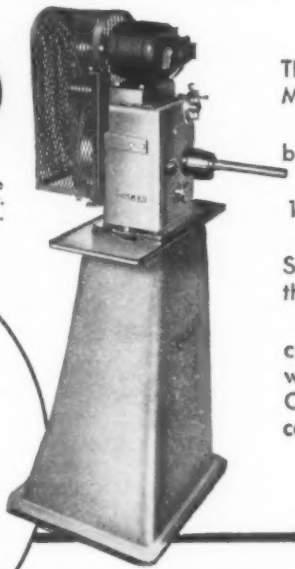
Aviation Hydraulic Cylinder made of Aluminum-Alloy. Improves the quality of the bearing surface. An extremely smooth surface-finish is secured.

Aircraft Valve Tappet Roller. 4-Micro finish.

and what's more remarkable, they can be trained for such accurate work in a few hours.

That's only one reason manufacturers of combat equipment and munitions have adopted the SUNNEN Precision Honing Machine.

The guaranteed accuracy (.0001") and super-smooth finish (2 to 3 micro inches) assure fewer rejects and interchangeability of parts. These advantages not only speed production, but prevent waste of vital war materials.



Low in Cost—Economical to Operate

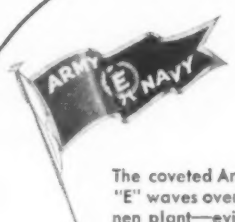
The basic price of the Sunnen Precision Honing Machine is only $195! And it's economical to operate.

No jigs or fixtures—work is held in hands. Relieves big internal grinders for other jobs.

Wide range—handles any internal diameter from 185" to 2.400".

Protect your previous operations by using the Sunnen method for that most important operation—the last one.

It's easy to find out just what Sunnen equipment can do for you on your job—one of our engineers will be glad to call and help you solve your problems. Or—if you prefer—write for free bulletin giving complete information.



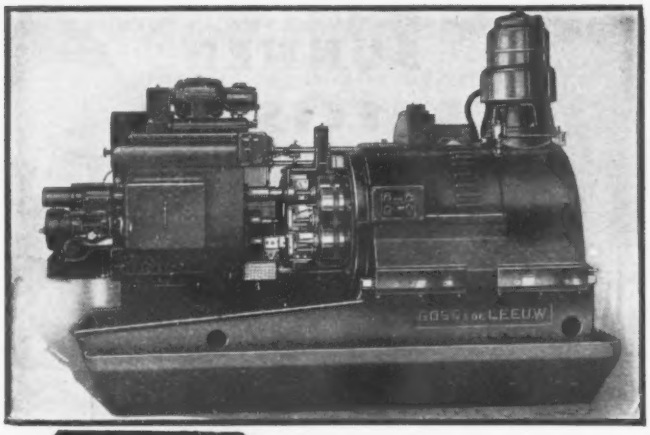
The coveted Army-Navy "E" waves over the Sunnen plant—evidence of the important part Sunnen equipment is playing in the war effort.

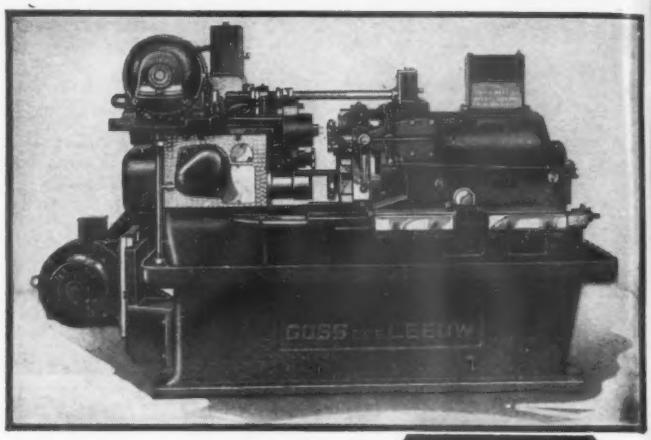
SUNNEN

SUNNEN PRODUCTS COMPANY, 7941 Manchester Ave., St. Louis, Mo.

Canadian Factory: Chatham, Ontario

GOSS & DE LEEUW *Multiple Spindle* CHUCKING MACHINES





WORK ROTATING TYPE
5 Spindles
6 Spindles
8 Spindles

Features include:

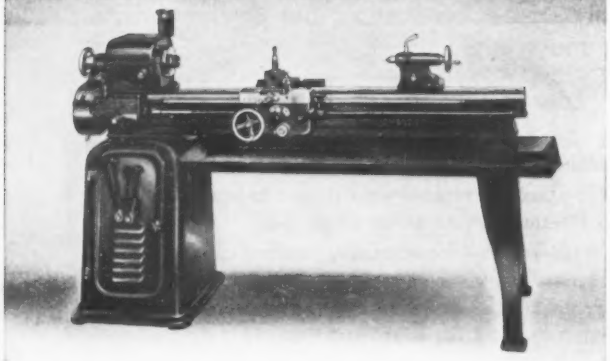
Lead Screw Threading on both types—Pre-loaded Anti Friction Spindle Bearings—Hardened Ways—Oversize Spindles—Gears of Chrome-nickel steel, carefully heat-treated.

Write for copy of descriptive catalog giving complete, detailed specifications.

TOOL ROTATING TYPE
4 Spindles
5 Chucking Positions

GOSS & DE LEEUW MACHINE CO., NEW BRITAIN, CONN.

SHELDON



SHELDON BBU-1242 WQ
Precision Lathe

★ This quality 12 in. ball bearing tool room lathe is built for precision work and will retain its accuracy under long and hard usage. It has extra collet capacity (to 1" round), the finest precision ball or roller bearings obtainable, an improved heavy-duty, double wall apron with power cross feed; full quick change gears and full bowl headstock. Its improved Sheldon 4-speed, V-belt, lever-clutch operated, underneath motor drive is entirely enclosed in the pedestal leg and has anti-friction bearings. It is so designed that spindle belts operate thru a *standard* 1-piece bed. This bed is bridge-braced with heavy cross girts and has hand scraped ways—2 V-ways and 2 flat ways.

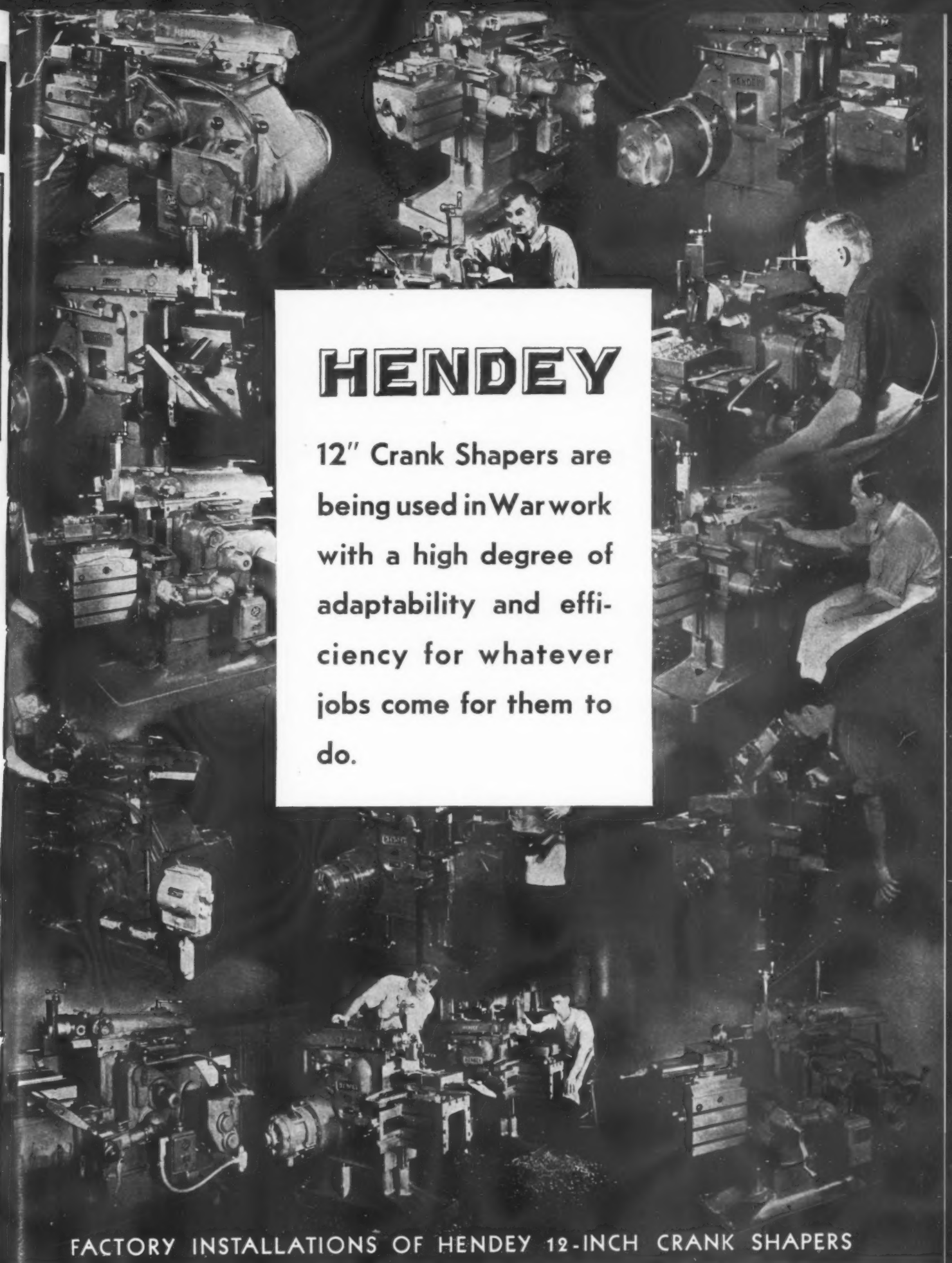
★ If interested in 10", 11" and 12" quality lathes be sure to see the SHELDON.

SHELDON MACHINE CO., INC.
4234 N. Knox Ave. Chicago, U.S.A.

Characteristic of the design of all STURDIMATIC LIVE CENTERS is a low overhang and a slight cushioning action . . .
that compensates for expansion due to heat, shock and excessive thrust loads—reducing wear to a minimum. A properly engineered live center is one of the fundamentals of setting up a job and requires a specialist's experience . . . standard shanks with Morse taper carried in stock

Send us your specifications and blueprints—We will see that your job is set up with the right LIVE CENTER—prompt deliveries on high priorities.

STURDIMATIC TOOL COMPANY
5214 THIRD AVE. DETROIT, MICH.

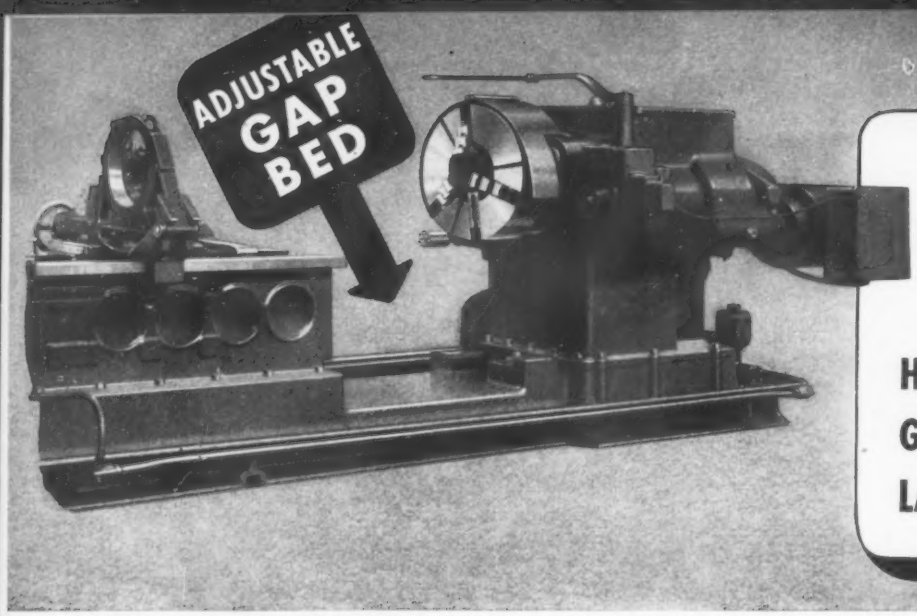


HENDEY

12" Crank Shapers are being used in War work with a high degree of adaptability and efficiency for whatever jobs come for them to do.

FACTORY INSTALLATIONS OF HENDEY 12-INCH CRANK SHAPERS

THE HENDEY MACHINE COMPANY • TORRINGTON, CONN. U.S.A.

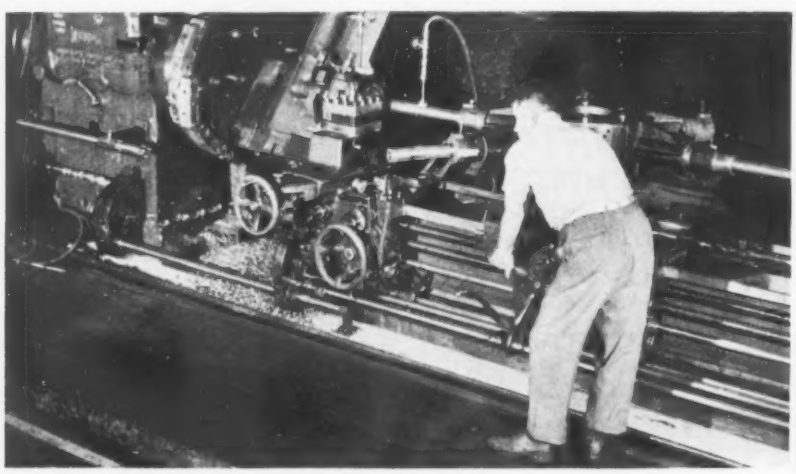


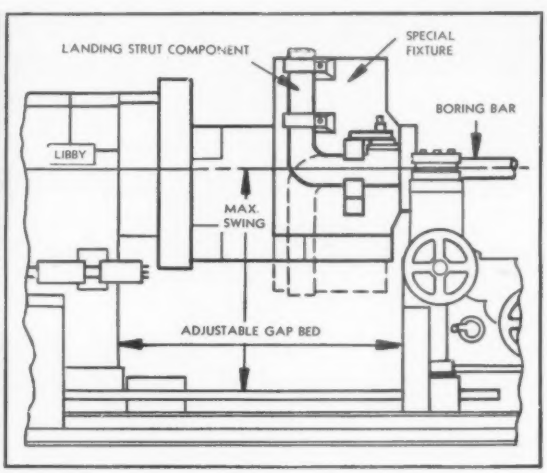
Libby

HEAVY DUTY, SLIDING BED GAP TURRET LATHES HANDLE LARGE, UNWIELDY WORK...

For Turning and Boring Operations on Large Non-Symmetrical Parts

The Heavy Duty Sliding Bed Gap Turret Lathe, an innovation of the Libby Division of the International Machine Tool Corporation, is proving an outstanding advantage in plants manufacturing landing gear struts, wheel forks, large Navy valves, etc. The additional swing—84″—provided by the adjustable gap bed permits the machining of parts having angular extensions or non-symmetrical shapes. In addition, the gap may be closed, converting the machine to a conventional turret lathe permitting the use of both tool post and turret tools.





Here is a typical application of the Sliding Bed Gap Turret Lathe . . . machining airplane wheel forks. The bed is adjusted by power to hold the gap width to a minimum for the work at hand. If need be, the gap may be widened to 44″ from the face of the chuck on this machine. After positioning, the adjustable bed is rigidly held by large clamps and bolts to the heavy cast iron sub-base.

In this operation the wheel fork is mounted on a large special fixture which weighs approximately 3,000 lbs. The parts are solid steel forgings and are machined from each end, performing turning, boring, drilling and radius forming operations. The end shown was completed in 1 hour and 20 minutes.

Our engineers, specialists in turning and boring large, heavy work, will be glad to make suggestions for handling parts of this nature on turret lathes without obligation.

THIS FREE BOOKLET contains additional information concerning other valuable features of the Libby Heavy Duty Turret Lathes . . . write for your copy today. Write to the Libby Division, 1126 W. 21st Street, Indianapolis, Indiana.

INTERNATIONAL MACHINE TOOL CORPORATION

LIBBY DIVISION, INDIANAPOLIS, INDIANA · FOSTER DIVISION, ELKHART, INDIANA

MAIN OFFICE AT ELKHART, INDIANA

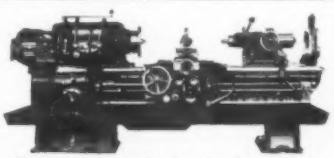
FOSTER FASTERMATICS · LIBBY HEAVY DUTY TURRET LATHES · STANDARD TOOLS

When peace comes we'll be ready...

In times of peace prepare for war, and in times of war prepare for peace.

Today with top pressure on every machine tool manufacturer, scarcity of materials, and shortage of machinists, there can be no change in design or construction. Production must continue at full speed, so the design in each size of Axelson Lathes has been frozen. Not so the thinking of engineering and development departments. Draftsmen and engineers are working constantly to take full advantage of the lessons learned from case histories of Axelson Lathes operating today under toughest conditions and unusual jobs.

Axelson Lathes are at work in war plants throughout the United States and abroad. They're in the arctics and in the tropics, they're on land and on sea, always giving uniformly satisfactory performance. From the performance reports on these lathes operating under every conceivable condition, Axelson engineers are studying ways and means to build greater improvements and even better performance into Axelson Lathes after the war is over. New materials are being analyzed, new designs are being checked, possible ways to increase power and cut down operating costs are being developed. You will be able in postwar years to benefit through this conscientious research carried on in the midst of wartime production.



For over 25 years Axelson has been manufacturing lathes which have established a reputation for quality and satisfactory performance. These lathes are available in 14, 16, 18, 20, 25, and 32 inch sizes and of varying lengths.

Write for descriptive literature.

AXELSON MANUFACTURING CO.
6160 S. BOYLE AVE., LOS ANGELES, CALIF.
(P. O. Box 98, Vernon Station)
50 Church Street, New York City, New York
3844 Walsh Street, St. Louis, Missouri

AXELSON LATHES

ARMY NAVY
THERE IS NO ECONOMICAL SUBSTITUTE FOR QUALITY

DEPENDABLE FOR OVER A QUARTER CENTURY

The ABRASIVE No. 1½ Hand Feed Surface Grinder

FEATURES

Built-in motor, an integral part of head; hand feeds, eliminate many moving parts; hand wheels of good size, conveniently located; vertical adjustment rapid and sensitive; wearing surfaces easily lubricated.

The Abrasive No. 1½ grinds accurately, gives a fine finish, and is recommended for the finest types of flat, form, and gage grinding. It is a hand feed grinder designed to handle the large number of jobs which consist of one piece only and for which no mechanic will bother to adjust automatic feeds and stops. It has an unusual capacity, handling work 15" long x 10" wide x 12" high.

The No. 1½ Grinder illustrated; and the Abrasive fully automatic grinders—No. 3B with horizontal spindle and No. 34 with vertical spindle—are described in Sweet's Catalog, or in more detail in separate bulletins available from any dealer listed below.

ABRASIVE MACHINE TOOL CO., EAST PROVIDENCE, RHODE ISLAND, U. S. A

WRITE OR PHONE NEAREST DEALER

HOME OFFICE
East Providence . . . East Prov. 0549

• • •

RUSSELL, HOLBROOK & HENDERSON, INC.
New York, N. Y. . . . Walker 5-6751

C. H. BRIGGS MACHINE TOOL CO.
Syracuse . . . . . Syracuse 2-4905

THE GEORGE KELLER MACHINERY CO.
Buffalo-Rochester . . . Riverside 1840

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Baltimore ..... Tuxedo 0104
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THE MOTCH & MERRY-WEATHER MACHINERY CO.
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CHENEY & MORETON
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MARSHALL & HUSCHART MACHINERY CO.
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MARSHALL & HUSCHART MACHINERY CO. OF IND.
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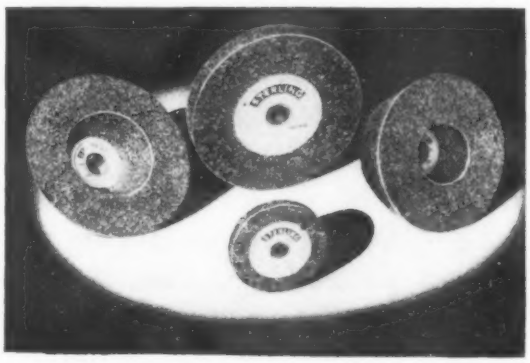
JENISON MACHINERY CO.
San Francisco ..... Valenia 1710

MILLIONS LIKE THESE *Are Fighting*

FROM Maine to California, they are marching in the morning and night - these workers on the home front. Men and women, members of the Industrial Second Front, are backing up the men in the Line, laboring long hours to turn out the ships, tanks, guns and planes that are to bring peace.



The tools used by these workers and the weapons they make are the spearheads of Democracy's drive. Upon their production depends the speed of our industrial effort and ultimate victory of our armed forces. We, at Sterling, welcome the opportunity that is ours to supply American Industry with the means of making these tools and weapons better and faster. To this goal, we dedicate the effort of every worker in our plant, laboratories, and offices.

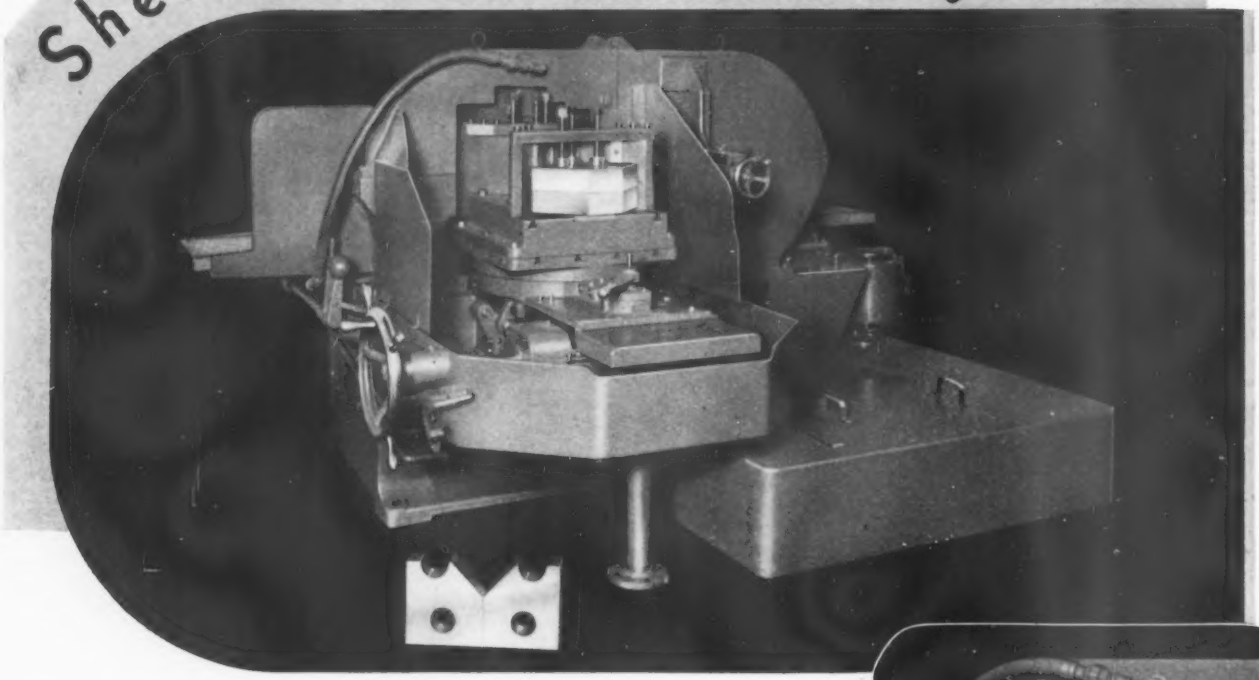
Sterling Grinding Wheels are made in all shapes and sizes for high speed snagging, tool room grinding, internal grinding, cut off operations, portable grinding, solid surface grinding, centerless grinding, and all other types of precision work. Sterling Chucks and Segments are widely used for grinding of armor plate and other tough steel jobs. Save time - use Sterling - "The Wheels of Industry"!

• STERLING ABRASIVES •

THE
STERLING GRINDING WHEEL DIVISION
OF THE CLEVELAND QUARRIES COMPANY
TIFFIN, OHIO

THE WHEELS OF INDUSTRY

Shear blades that *shear forever-*

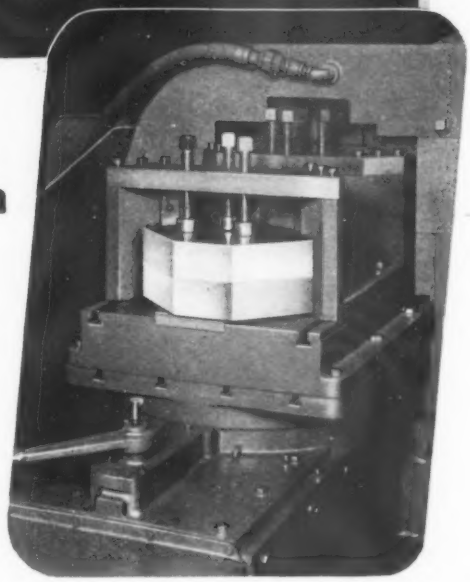


or *almost*-- due to this GARDNER-GRINDING operation

IN a large forge shop, the alligator-shear blades seen here, must be resharpened from time to time, as their cutting edges become worn and dulled.

The No. 96 – 30" Gardner Hydraulic Surface Grinder provides a quick, convenient means of accomplishing this operation. The entire grinding head travels, the work table remaining stationary, which makes it possible to use an indexing type of fixture, as shown, with the operator loading one station while the other is presenting a shear blade to the grinding wheel. Constant, steady operation — no time lost in fixturing.

On the shear blades shown in the "close-up", one edge and two large side surfaces are ground in 50 to 60 minutes, complete.



On maintenance jobs like this, or on production work, the GARDNER No. 96 — 30" SURFACE GRINDER is ideal.

WRITE FOR COMPLETE DATA ON THIS MACHINE!

GARDNER - GRIND YOUR *Flat* SURFACES

GARDNER MACHINE COMPANY

410 East Gardner Street , , , , Beloit, Wisconsin, U.S.A.

BAKER

Makes a new Contribution

TO THE WAR EFFORT

—in this BAKER MODEL 217—a standard geared feed, heavy duty drill, single purpose type—one more of the many well known BAKER single or multiple spindle drills, and special production machines.

Shown here is an adaptation of BAKER MODEL 217, tooled for operations in the nose end of 500 lb. bombs. Note the cutting tools used for boring and facing the nose end. This is a mechanical clearance to accommodate 500 lb. bombs. With extra adapters machine has sufficient clearance to also handle 1000 lb. bombs.

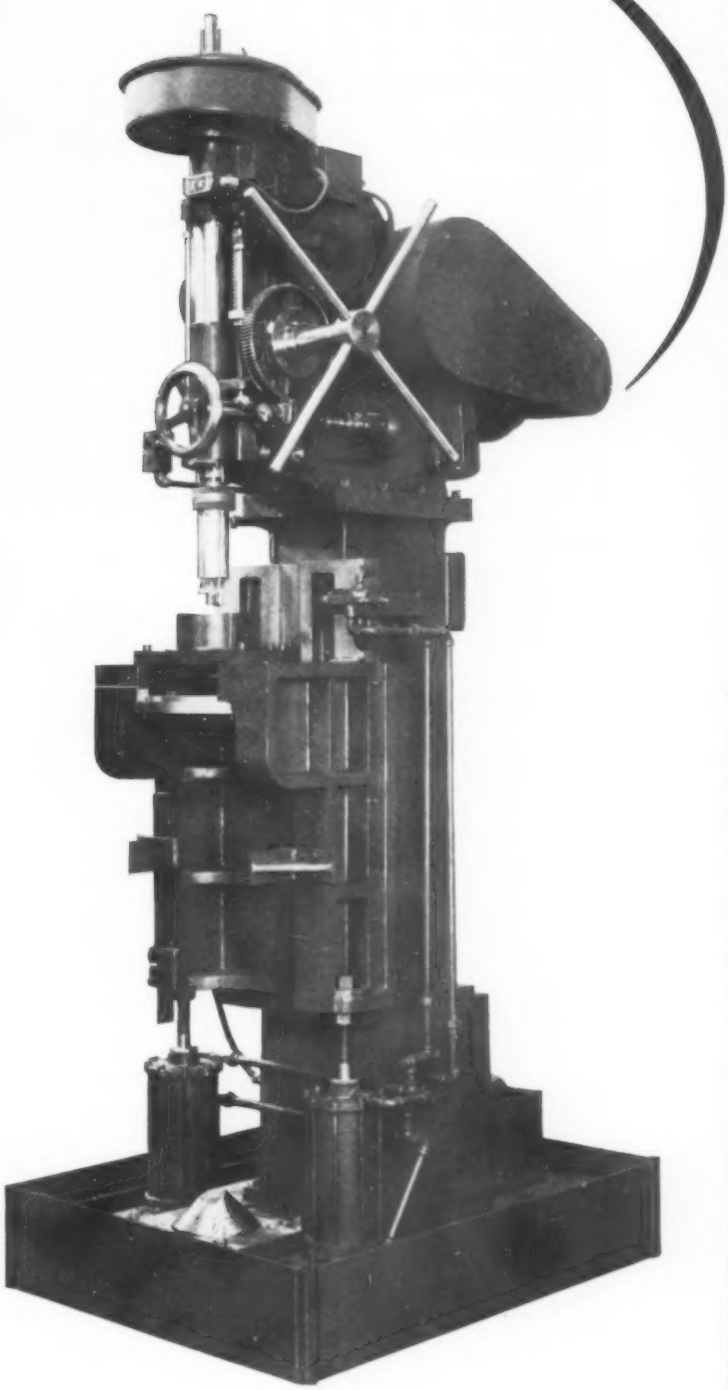
Operations handled on this installation are:

Drill from the solid
Rough coredrill and rough face
Finish ream and face
Tap

These operations are handled on individual machines, re-chucking for each operation.

The illustration shows the flexibility of this type of equipment for simple tool-ups on munition work. A battery of these machines set side by side was furnished to one of the leading producers of bombs, for the various operations (consisting of four different operations in the nose end).

Just one more example of BAKER's ability to furnish machines to do the job—and do it right! For efficient operations on special jobs now, and the assurance of future usefulness, select BAKER machines. When you have a problem in tapping, drilling, boring or facing, let BAKER help you solve it! Write for complete details today!



BAKER BROTHERS, INC. • Toledo, Ohio, U.S.A.

Our Motto Since 1867:
"Machines Sturdy and Efficient, as Fine as Can Be Built..."

DRILLING
BORING
TAPPING

MACKLIN
GRINDING WHEELS

There is a MACKLIN wheel for every grinding job. If you are having any grinding difficulty call for a MACKLIN Field Engineer—no obligation.

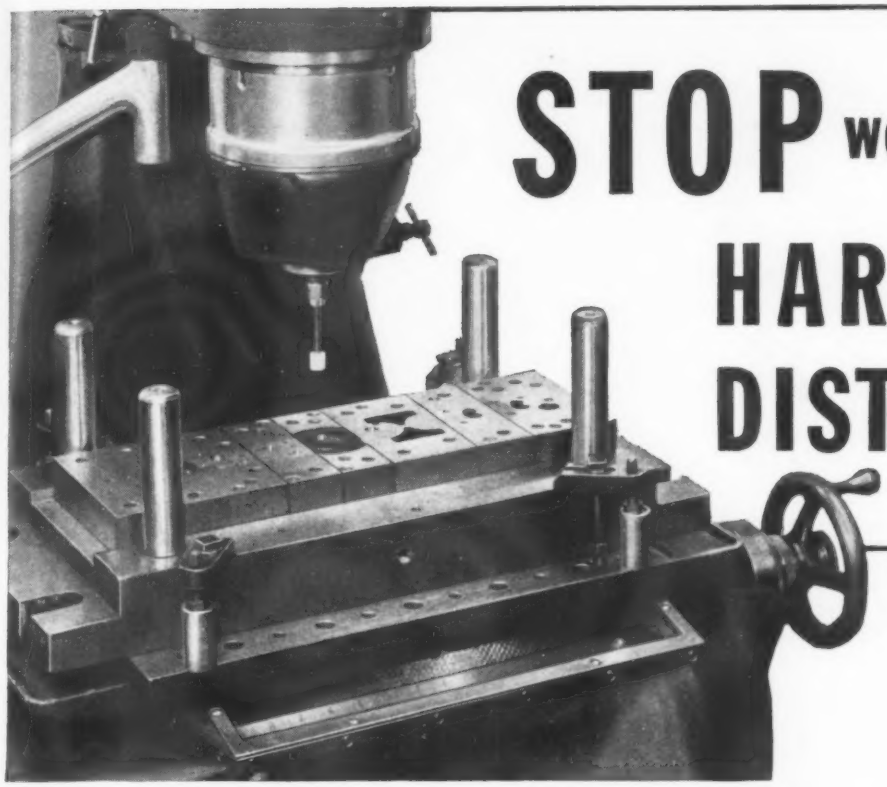
THANKS! FOR PUTTING US STRAIGHT ON THAT GRINDING JOB— AND FOR RESPONDING SO QUICKLY TO OUR WIRE FOR ASSISTANCE
THAT'S MY JOB "PROTECT YOUR PRODUCTION"
MACKLIN FIELD ENGINEER

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS — JACKSON, MICHIGAN, U. S. A.

Distributors in all principal cities

Sales Offices: — Chicago - New York - Detroit - Pittsburgh - Cleveland - Cincinnati - Milwaukee - Philadelphia



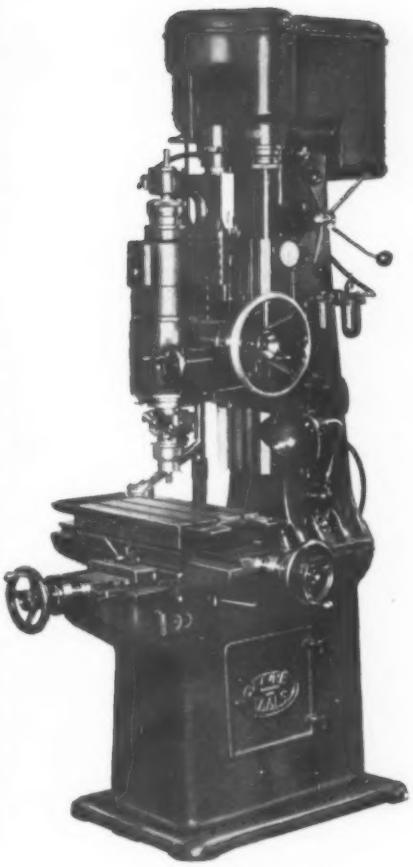
STOP worrying about HARDENING DISTORTION!

USE THE MOORE JIG GRINDER

How would you do this job without a Moore Jig Grinder? Most likely you would swing each of the six sections up on an internal grinder, going through all of the laborious steps of centralizing, locating, indicating, grinding, re-assembling and checking. With the Moore Jig Grinder you do it all in one setting, with the die completely assembled in its own die-set and located on its own dowels—*in one-quarter the time!*

Until recently, distortion due to hardening was a bugaboo in the production of tools and dies for precision parts. Correcting the position of holes after hardening was a costly, highly skilled, and, at best, makeshift process. But with the Moore development of the Jig Grinder, a machine new to tool-and-die practice, you can now with speed and ease relocate your holes and finish-grind them, straight or tapered, *within .0001".*

The Jig Grinder was created in the Moore toolrooms by Moore tool-and-die specialists specifically to solve the problem of hardening distortion on dies, drill jigs, master plates and precision gage parts. Besides saving toolroom time, it increases the life of a die from two to twenty times that of an unground die. It has a capacity to grind holes from .030" to 4", accuracy of screws of .00005" per inch, and grinding speeds of 15,000, 25,000 and 45,000 RPM.



Partner in Production

Moore Jig Borer bores the holes in these die sections before hardening, thus holding the location as close as possible to eliminate excessive grinding. Send for literature on both machines.

Manufactured by MOORE SPECIAL TOOL CO., INC • Bridgeport, Conn.

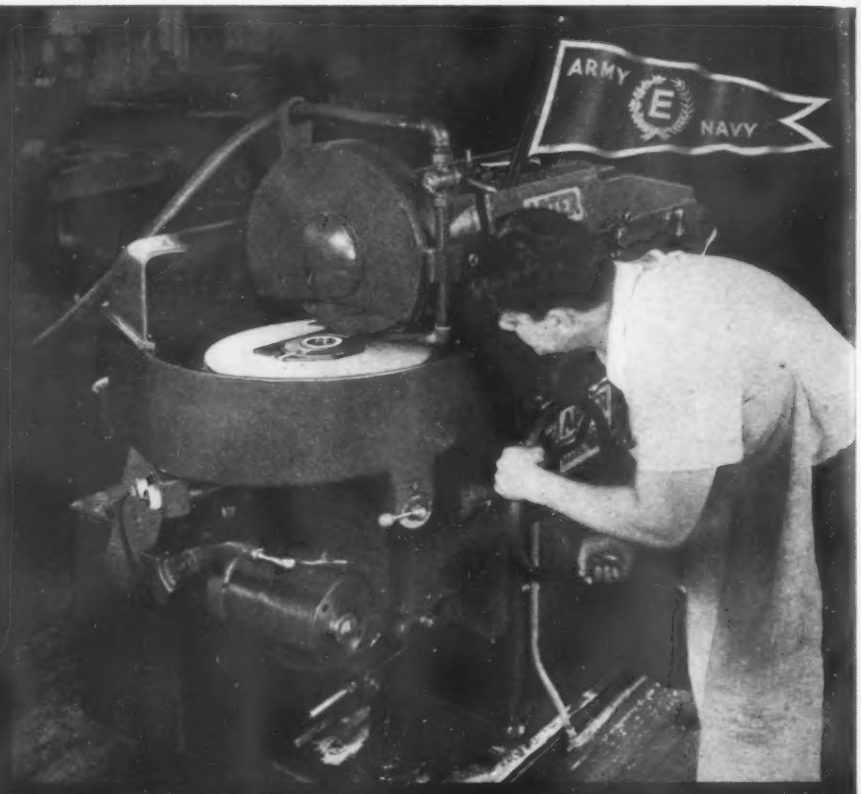
MOORE DIRECT TOOLS

EXCLUSIVE DISTRIBUTORS: **MARBURG BROTHERS, INC • 90 WEST STREET, NEW YORK, N. Y.**

War-learned efficiency will create new competition, new and better products in the new world of the future when Victory is ours. New skills and new techniques are being developed.

In the new world of the future, precision-grinding — in quantity — will plan an increasingly important part.

The makers of ARTER ROTARY SURFACE GRINDERS are looking into that future confident that the Arter developments in rotary surface grinding will help you in your precision production plans for the peacetime future of America.

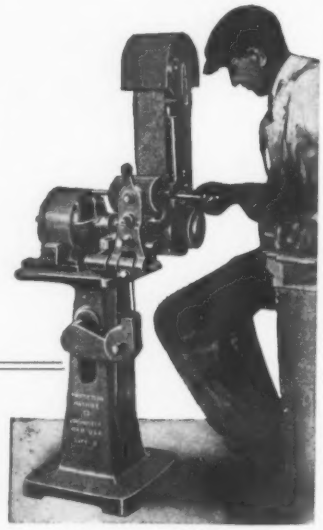


ARTER

ARTER GRINDING MACHINE COMPANY

WORCESTER, MASSACHUSETTS • U. S. A.

PUT YOUR CYLINDRICAL OR FLAT WORK on the TYPE "S" CENTERLESS GRINDER for Speed and Convenience



Type "S" Grinder in Horizontal Position for Hand Surfacing.

This "Production" Machine combines a centerless feed polishing machine with a vertical or horizontal belt grinder, surfacer, polisher or buffer. Cylindrical polishing or straight line finishing on flat work can be handled on the Type "S".

With centerless feed attachment, cylindrical work from ¼ to 1" dia. may be handled automatically. High speed feed and fine uniform finishing are assured.

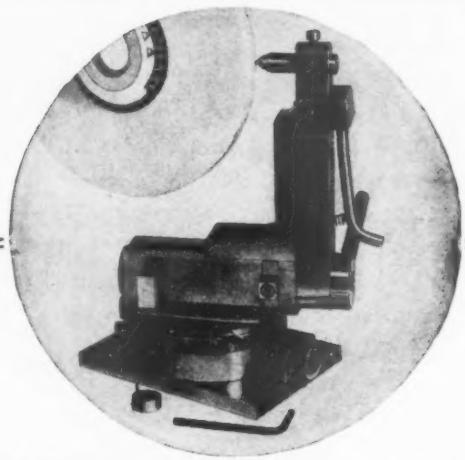
Flat and irregular work may be finished by hand manipulation. Easy removal of flat surfacing bed provides for convenient handling of irregular shapes.

FULL DETAILS ON REQUEST

PRODUCTION MACHINE CO.

Manufacturers of Drilling Machines, Tool Grinders, and Head and Automatic Polishing and Grinding Machines.

GREENFIELD, MASS., U. S. A.



An instrument of precision and versatility . . . Operation is simple requiring no high degree of skill for accuracy . . . Any one of the following can be produced with one setting:

One angle	Two angles and radius.
Two angles	Many other diversified
Concave radii up to 8"	forms to meet require-
Convex radii up to 4½"	ments.

Wheel size capacity—9" dia; angular travel 3"; for use on universal surface and cylindrical grinders.

Full details available on request.

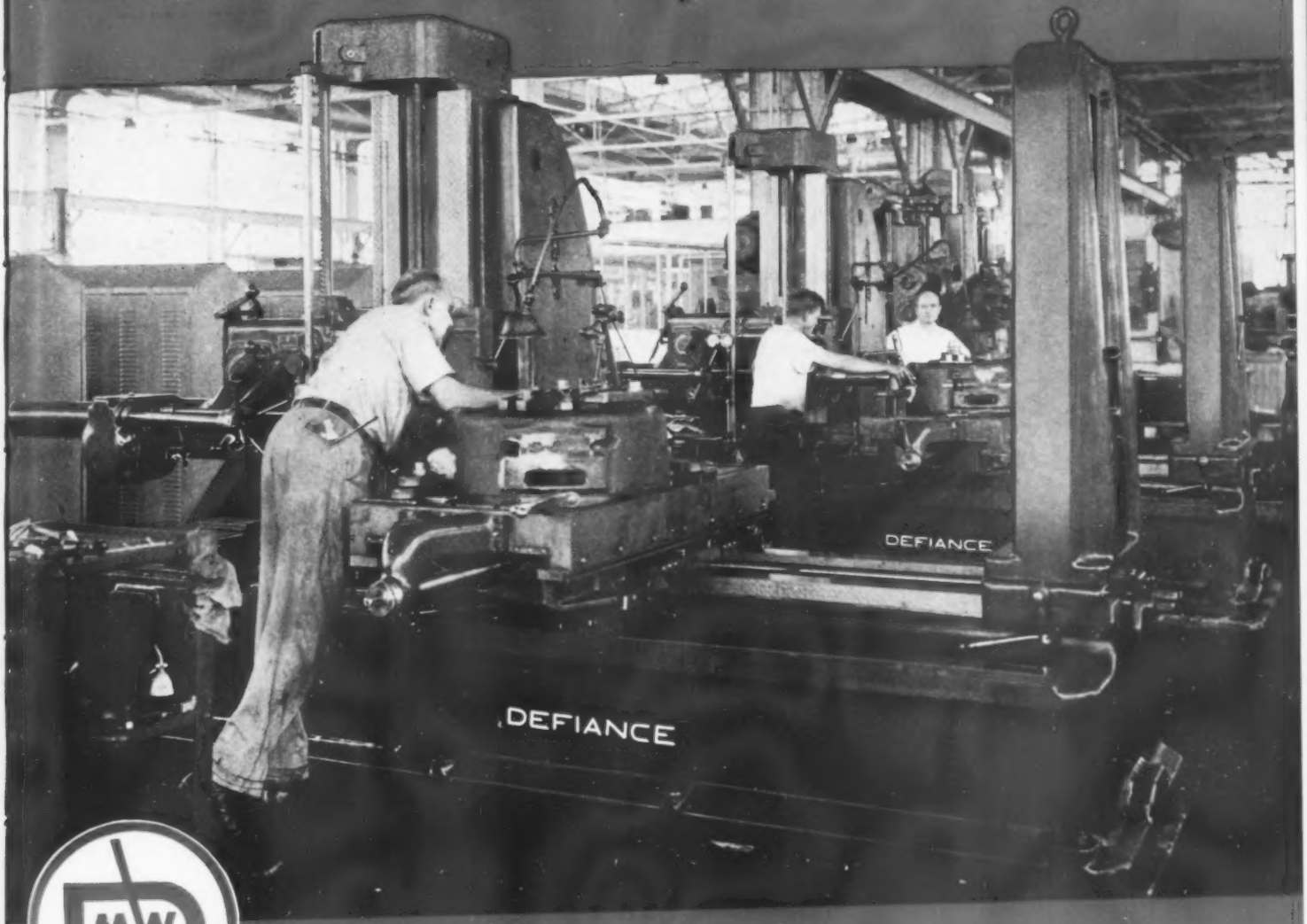
A RADII & ANGLE DRESSER OF PRECISION AND VERSATILITY

MANUFACTURED BY

J. & S. TOOL CO. 477 MAIN ST., EAST ORANGE - N. J.

Top Speed

WITH GREATEST ACCURACY AND EFFICIENCY



Extreme accuracy of Defiance Machines helps many great American plants turn out tough war jobs with top efficiency and speed. The plant shown here relies on Defiance Machines in producing parts for tanks and gun mounts.

Defiance builds the only horizontal boring mill having outboard bearings an integral part of the machine, thus eliminating worry as to accuracy of supports. Complete oversize construction insures outstanding ruggedness and precision . . . absorbs vibration!

Experienced shop men find Defiance Mills *built right* in rigidity and strength . . . with thoroughly practical features and dependability to "keep 'em producing" and minimize expensive down time. See our insert in Sweet's Mechanical Catalog or send for latest bulletins. Defiance Machine Works, Inc., Defiance, Ohio.

Makers of Precision Machinery Since 1850

Horizontal **BORING . . MILLING . . DRILLING . . TAPPING** *Machines*

DEFIANCE

IDEAL
METAL ETCHER

14 Heats!

Permanently Marks All Iron, Steel, or Their Alloys

NEW

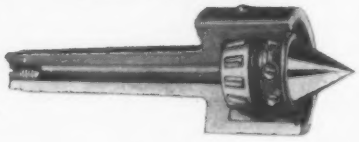
Prevents Delays Due to Loss, Theft, etc.

New, all-purpose Etcher for electrically marking important information on smooth-surfaced Parts, Tools, Dies, Gages, etc., 14 Heats—115 to 1300 Watts. Low heats for fine lines on small and thin parts—high heats for bold lines on large and heavy parts. Etches legibly, easily, permanently, regardless of the hardness of the tool or part. Heat-indicating lamp brightens as heat increases. Convenient ground clamp for etching large, heavy parts and castings.

MOST COMPLETE LINE ON THE MARKET

IDEAL
LIVE CENTERS

Turn Heavier Loads *FASTER!*



On lathes, millers, grinders, etc., Ideal Live Centers produce more work quicker, because they rotate *with* the work—permit machines to be run at full capacity. Save set-up time. 3 interchangeable inserts for all centered and uncentered work. High precision radial ball bearings and tapered roller bearing.

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Machine Tool Accessories Catalog
Gives full details on IDEAL Live Centers, Demagnetizers, Marking Tools, Balancing Ways, and other Machine Tool Accessories. Send for your copy, today.

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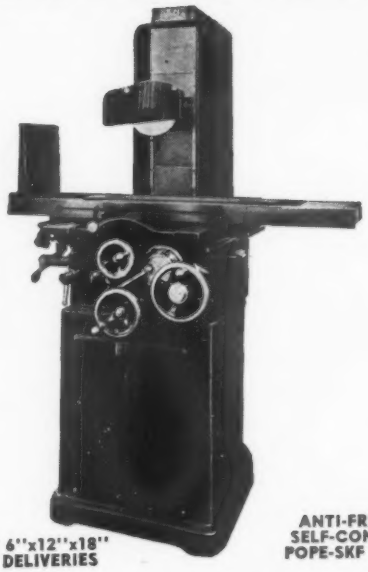
No. 2 Automatic Precision
SURFACE GRINDER



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FLATNESS *and* SMOOTHNESS *of Production Parts*

The Ultra-Lap machine will finish your parts to a flatness of one light band or less . . . to a smoothness as low as one micro-inch R.M.S., any metal or material. Much faster, more uniform than hand method. Machine designed for you or we shall be pleased to lap your parts on a job basis. Ultra-Lap machines and service used by aircraft and many other war-time industries.

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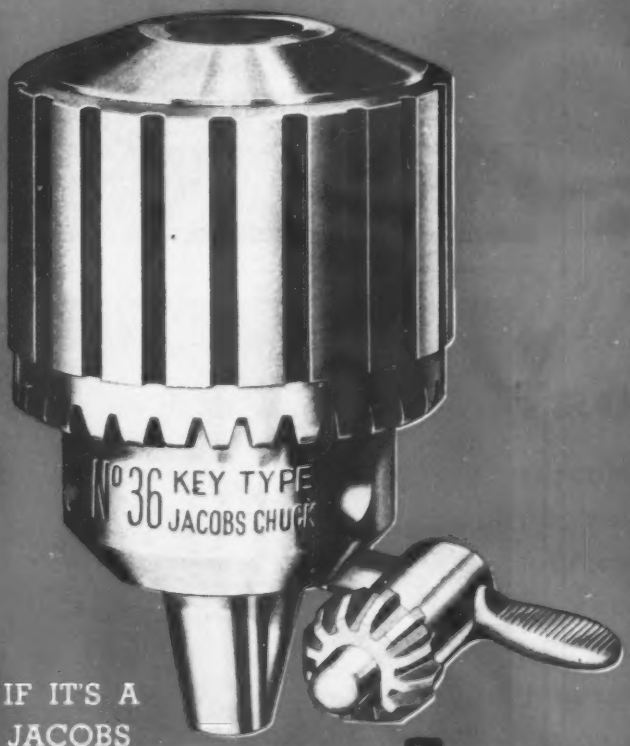
Confidence in Jacobs Chucks is justified by exclusive designs for maximum strength, closer accuracies, powerful grip and long wear. Their unfailing performances assure speed on the production fronts, victory on the battle fronts! The Jacobs Manufacturing Co., Hartford, Conn.

THE NATIONAL STANDARD FOR WAR PRODUCTION



"IF IT'S A JACOBS IT HOLDS!"

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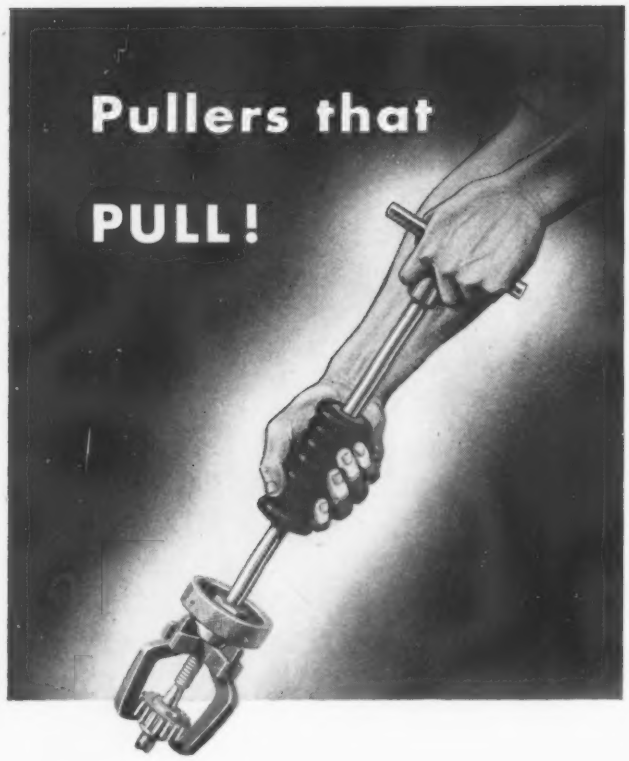

in the *Complete* Plomb Line

Designed to do a job, Puller No. 4056—a popular member of the Plomb puller family—pulls quickly, efficiently, safely. Together with many other fine hand tools in the famous Plomb Line, it is helping to build better weapons—faster. If you need hand tools of highest quality to speed your war work, see your Plomb dealer. There is one near you.

36 factories permit 2-fold service

In addition to ***regular tools*** for war needs, ***special tools*** of Plomb design and manufacture can be supplied to meet your hard-to-get-at problems through the facilities of Plomb Tools Contracting Company, a division of the Plomb Tool Company. This double service is made possible by 33 sub-contracting companies who cooperate with Plomb's own three factories in making tools for war needs.

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PLOMB TOOL COMPANY
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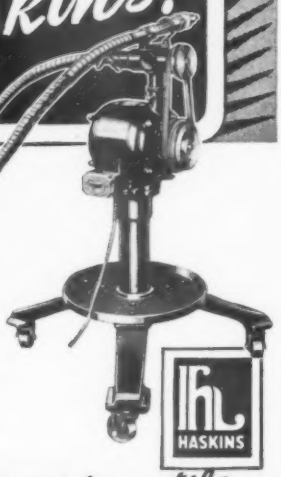
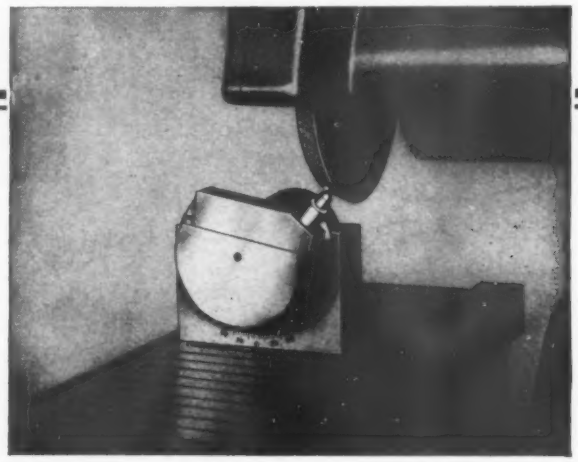
FINISHING OPERATIONS
Cost less on Haskins!



YOUR MEN work faster with easy-handling Haskins Flexible Shaft Machines. Maintenance costs are less. Machine life is longer. There are 30 different types of Haskins Equipment, each engineered to do *many* kinds of jobs. Send for Catalog 45. Shows many ways to speed production. R. G. Haskins Company, 2760 W. Flournoy St., Chicago.

HASKINS *Versatile* FLEXIBLE SHAFT EQUIPMENT



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THE Welch Quick Angle Dresser can be set quickly for dressing the grinding wheel to any desired angle. It is compact, durable; simple in construction. All surfaces are hardened and ground. Furnished in plain or Vernier type. Plain dresser graduated in degrees. . . . Vernier reads in degrees and minutes. The Vernier being an integral part of the base block eliminates any possibility of error. 10 DAYS FREE TRIAL IF DESIRED.

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Plain Type, $70 Net

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Makers of High Speed Milling Cutters . . . Form Tools and Special Tools

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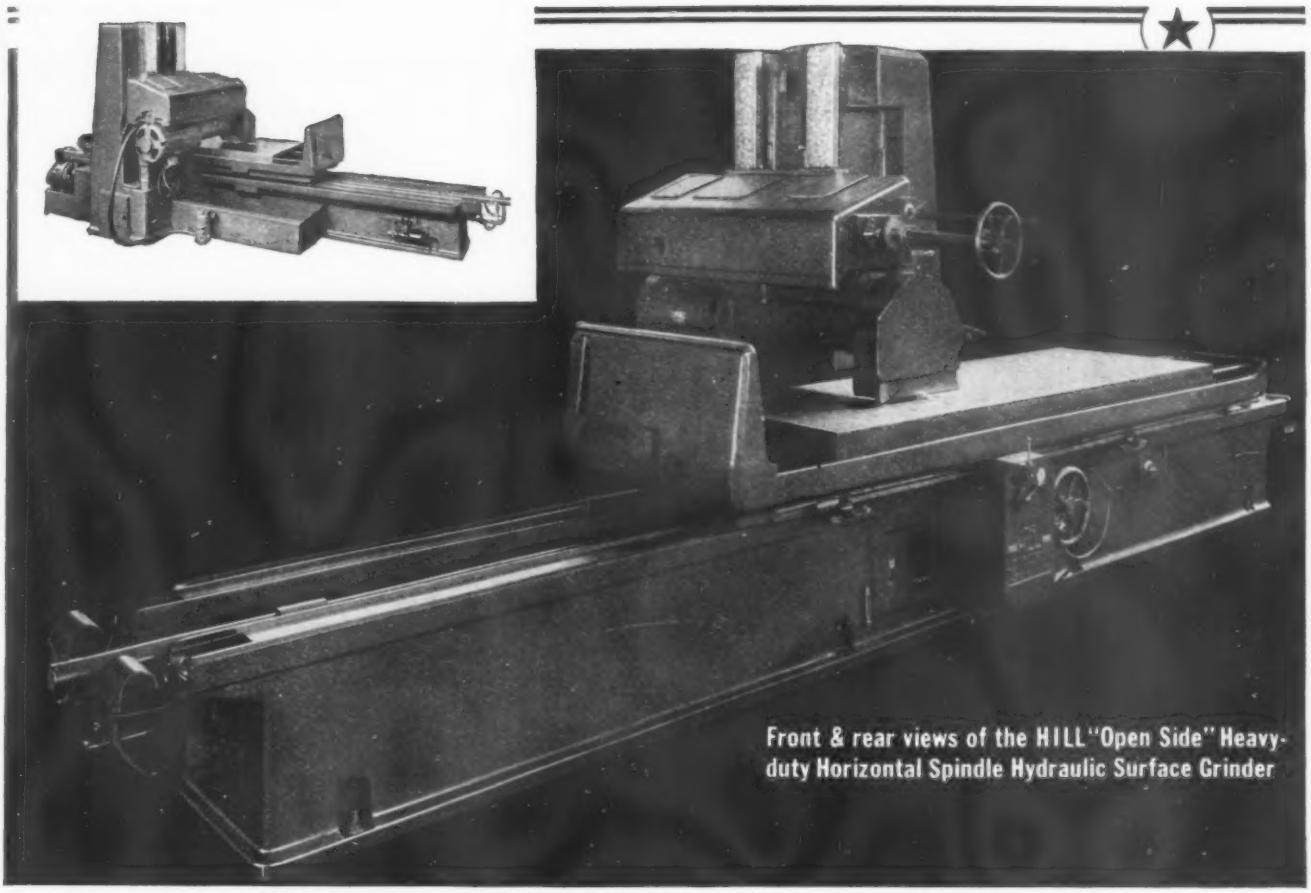


Front & rear views of the HILL "Open Side" Heavy-duty Horizontal Spindle Hydraulic Surface Grinder

★ ★ ★ *easy to operate* —

CONTROLLED PRECISION

HORIZONTAL

VERTICAL

Today's *man power* problems make it imperative that machine tools be easy to operate so that inexperienced operators can quickly learn—yet precision work is demanded today as never before. HILL "Open Side" Hydraulic Surface Grinders hold the answer to both problems. In a remarkably short time, men transferred from non-essential industries are being trained to produce finished parts ground to close tolerances. We will gladly furnish you with names of HILL "Open Side" Grinder users in your territory—Ask THEM what THEIR HILL Heavy Duty Precision Grinders are doing, or send for Bulletin H-V-3 and be your own judge from the facts presented.

The HILL ACME CO.

6400 BREAKWATER AVE • CLEVELAND, OHIO

"Blount" MODEL F. WET TOOL GRINDER

New!.....for tool room or shop—assures stepped up production

The MODEL "F" is a distinctly new wet tool grinder with advanced features which adapt it to modern production in grinding all hard metal, special alloys and tungsten carbide. It is built for long, hard service and can be depended on to speed up grinding operations. It is built in 14", 20" and 30" sizes.

Outstanding features include:

. . . motor mounted in air-flow base for cool running. It is easily accessible for take-up of multi-v belt.

. . . quick and easy wheel change made possible by merely removing cover on wheel side unscrewing a single nut and removing flange.

. . . oversize spindle shaft turns on Timken tapered roller bearings mounted in specially designed pillow block, easily adjusted.

. . . constant flow oiling of positively sealed spindle bearings.

. . . wheel and shaft adjustable for balance.

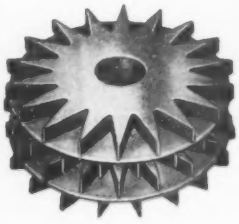
. . . all belts are completely adjustable.

. . . wheel dressing simplified by means of a new combination tool rest and wheel dresser permanently located in front of wheel.

. . . convenient remote control provided for coolant.

Send for CIRCULAR A-7 which contains complete details and specifications.

J. G. BLOUNT CO., Everett MASS., U. S. A.



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GRINDING WHEEL DRESSERS & CUTTERS

We manufacture a complete line of wheel truing tools and can supply the proper dresser for each of your grinding wheels.

SIMPLEX
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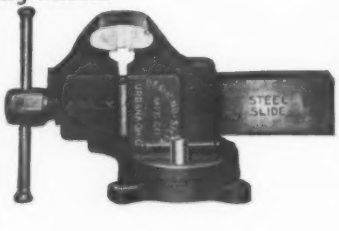
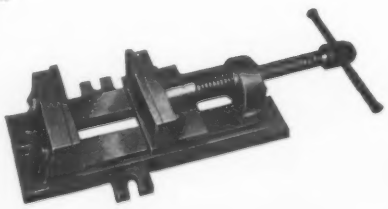


A full line of Machinists, Welders, Filers, Production and Drill Press & Milling Machine Vises with solid steel slides.

Write for copy of catalog "A" and name of your nearest dealer who can supply you.



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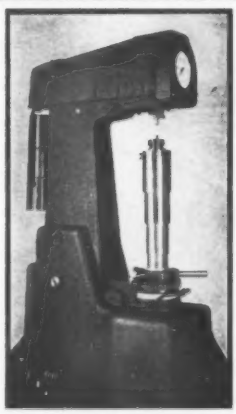
HARDNESS TESTER

BETTER and BETTER EACH YEAR SINCE 1921



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MECHANICAL INSTRUMENT CO., INC
Concord Ave. New York

The RANDALL & STICKNEY
Dial Test Indicator

A valuable instrument for erectors and inspectors

Especially convenient for checking accuracy in surfaces and spindle movements; also for obtaining comparative measurements on close work and for lining up work on machine tools.

Horizontal arm adjustable and can be removed for independent use. With blocks fitted into T slot of base, this R&S indicator can be used against edge of surface plate for checking accuracy of long horizontal surfaces.

Dial diameter 2⅛"; base 8½x2¼".

Complete details on request.

RANDALL & STICKNEY, Waltham, Mass.

NOW—24 hours a day—

ALL-OUT PRODUCTION OF

DALZEN TOOLS

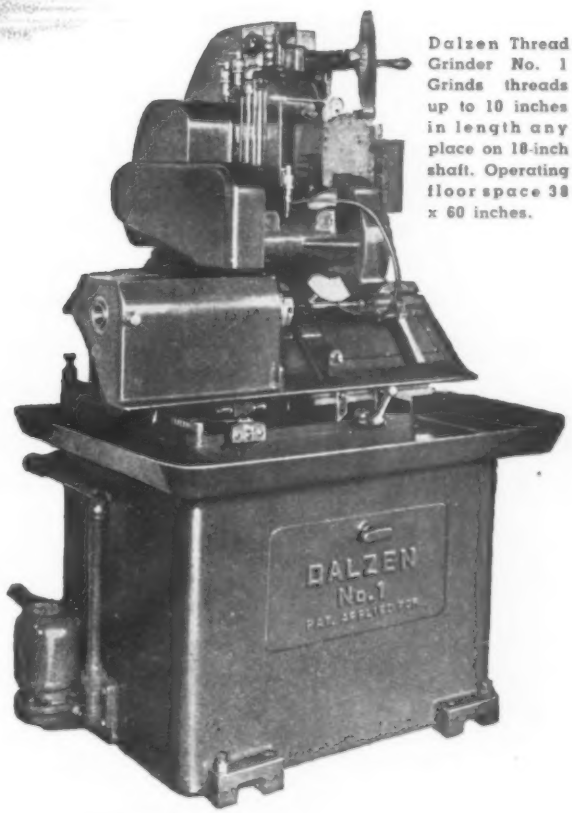
TO FILL WAR ORDERS
TO SPEED OUTPUT

- ***Dalzen Thread Grinders***

Taps • Thread-Milling Hobs and Broaches mean fast absolute precision

It's significant when we tell you we're producing Dalzens straight around the clock every day—but we've *tripled* our plant to take care of the big demand from industries working on Army, Navy and Air war equipment! That proves that Dalzens can be depended upon for speed plus high precision in grinding threads 4" and 10" in length, right and left hand, in U. S. Standard, modified and British standard and special forms.

Their compactness and vertical design insures constant equilibrium.



Dalzen Thread Grinder No. 1 Grinds threads up to 10 inches in length any place on 18-inch shaft. Operating floor space 38 x 60 inches.

THE DALZEN LINE OF TAPS AND THREAD MILLING HOBS INCLUDES BOTH THE WHITWORTH AND U. S. FORM.

DALZEN ALSO MANUFACTURES ROUND AND FLAT BROACHES.

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Announce their removal to:

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where augmented facilities, efforts and skills will be, as in the past, at the disposal of their clients.

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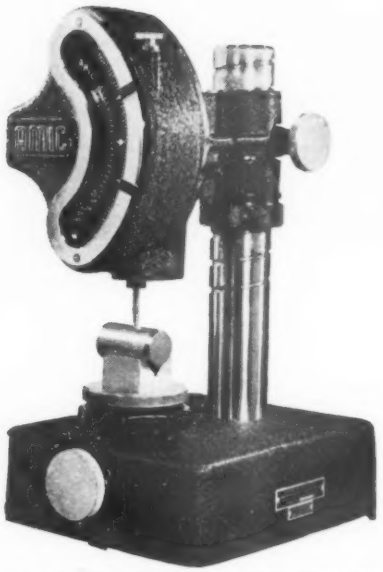
MANUFACTURERS OF INDICATING GAUGES, PLUG RING SNAP GAUGES, JIGS, FIXTURES AND INSTRUMENTS

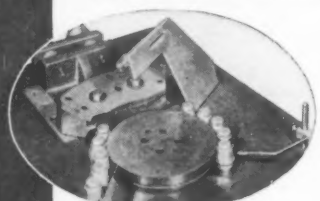


AMIC PRECISION INDICATING GAUGE

FUSE MARKING

with Matthews No. 201 Machine

All required data is marked on fuse bodies, fuse parts, or other round pieces with this fast production machine. Practically all sizes and models of fuses can be marked.



The insert, above, shows a close-up of how fuse parts are marked. Parts are carried around on the pressure dial table and are quickly and legibly marked when rotated between dial and steel type holder. Write for literature.

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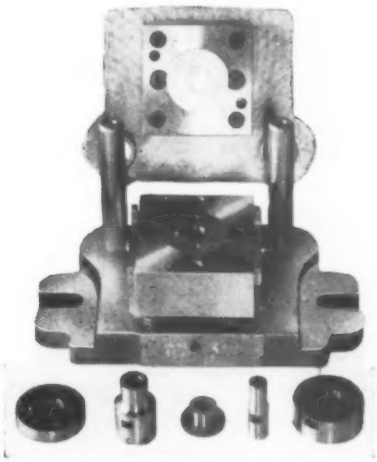
If So, You'll Find It Well Worth-While To Be Entirely Familiar with the Patented Principle of Making Washers . . . the "HOVIS WAY."



MADE IN FOUR SIZES:
¼" . . 1½" . . 2½" . . 4"

THE OLD WAY

By this method, a complete compound die was purchased for each washer. This means a large inventory of expensive dies. . . . It means you must buy material for a complete die for every new size and type of washer. . . It also means you must pay costly labor charges incurred in making a new die.

THE HOVIS WAY

Here, you buy a set of relatively inexpensive Hovis Universal Master Washer Dies. For each new size washer, merely change five easily interchangeable parts of the die. Thus, you save time, precious materials and money, as well as have the facilities to make washers to suit your needs on short order.

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Calls for the Right Machines, Methods and Materials!

FOR STEEL SHELL CASES

ABOVE: The first cleaning machine built for the new steel shell cases—a pickling, washing, neutralizing and sulfurized tallow coating machine for 37mm shell cases prior to drawing. Capacity 3000 - 5000 lbs. per hour.

Effective cleaning at mass production rates is just as dependent on adapting the cleaning material and method to a particular operation as it is on the design of a special washing machine properly geared into the production line.

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OFFERS YOU ALL THREE . . . PLUS

1: A complete line of specialized metal cleaners

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PLUS: *Quick* service, particularly in delivery of machines. If you want to speed production and solve man-power shortages by fitting your cleaning operations into the production line, call on Magnus for the complete coordinated service that insures quick results and better cleaning.

Write now for your copy of this new metal cleaning handbook—the first complete manual on materials, methods and machines for metal cleaning.

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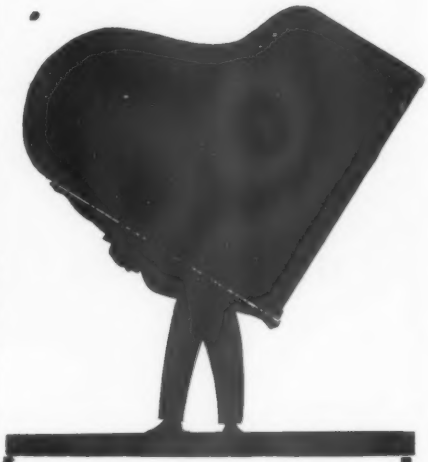

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If you plan to change the address to which your copies of *American Machinist* are sent, let us know now. We don't—and we're sure *you* don't—want a single issue to be delayed in reaching you. Coupon below for your convenience.

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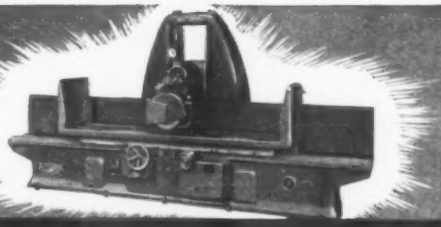
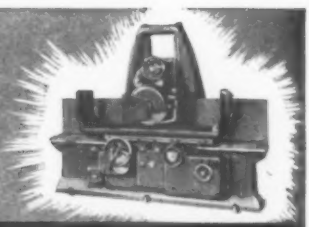
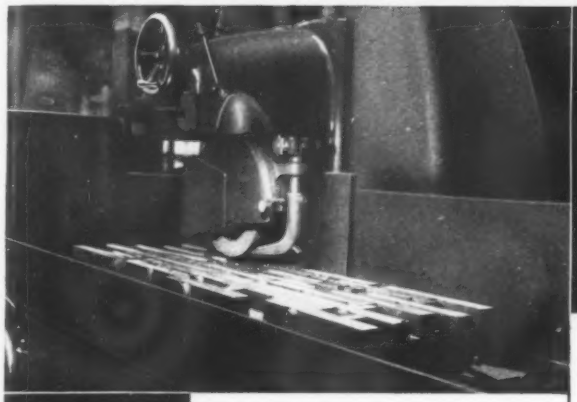


MATTISON
HIGH-POWERED PRECISION SURFACE GRINDER





Large Table Space Means More Pieces per Load and GREATER PRODUCTION

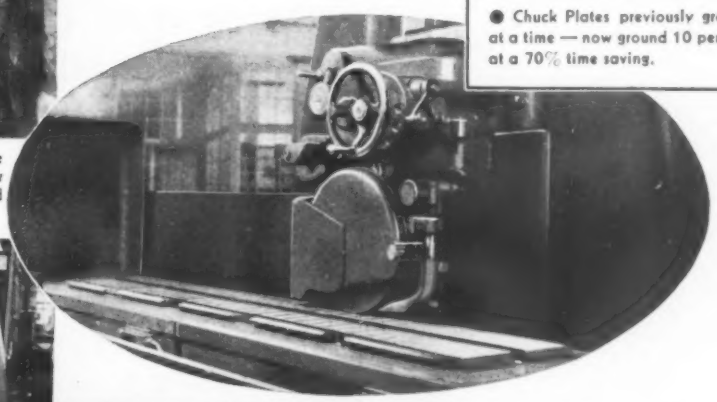
● Cross Slide Draw Bars formerly ground 5 pieces at a time. Now ground on a Mattison Grinder 27 pieces per load, 50% time saving.

Examples: Grinding 75 pieces per load instead of 18 — cut time 80% . . . . . 10 pieces per load instead of 2 — cut time 70%, etc.

Jobs shown indicate the possibilities for increased production by handling large quantities per set-up. In your efforts to obtain maximum production, it will pay you to check into the capabilities of the Mattison Grinder.

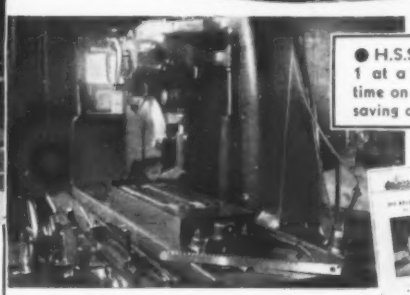
● Caps previously ground few at a time on small grinder. Now, Mattison Grinder handles 75 at a time. Time was reduced from 7 hours to 30 minutes.

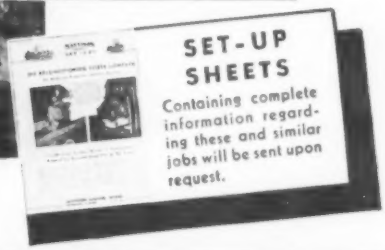
● Chuck Plates previously ground 1 at a time — now ground 10 per set-up at a 70% time saving.



● Head Slide Guides formerly ground one at a time in 36 minutes — Now ground on a Mattison Grinder 9 pieces per set-up at a 77% time saving.

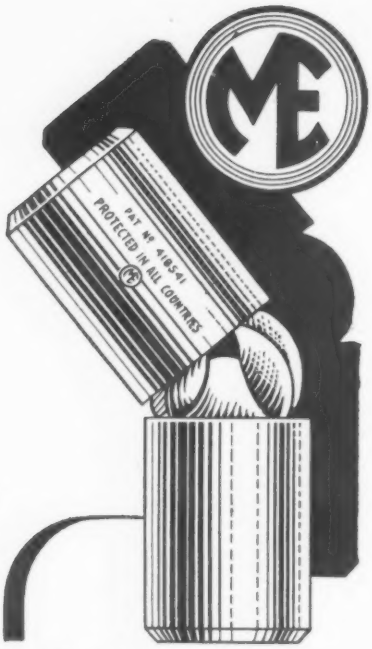
● H.S.S. Broaches previously ground 1 at a time — now ground 10 at a time on a Mattison Grinder, at a time saving of 50%.





SET-UP SHEETS
Containing complete information regarding these and similar jobs will be sent upon request.

MATTISON MACHINE WORKS
ROCKFORD • ILLINOIS



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UNIVERSAL BALL JOINTS

- Made in a range of 9 sizes for shaft diameters ¼" to 1⅛".
- Standard Joints have maximum angle of 38° from the straight line.
- Made by the largest manufacturers of UNIVERSAL JOINTS in Great Britain.
- Widely used in Machine Tools, accessory drives and on Aircraft.
- Certified 92% to 98% efficient by the British Government's National Physical Laboratory.

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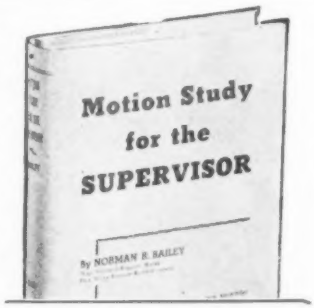
How to stop waste motion and speed up production

This book gives a simplified, practical method of motion study for analyzing operations quickly and easily, enabling the foreman to employ motion study as a useful, everyday tool in speeding production and increasing output in his department. It shows how to detect wasted effort in operations, how to recognize the cause of ineffective work, and how to develop better job methods.



MOTION STUDY for the SUPERVISOR

By Norman R. Bailey

Wage Standards Engineer, Kodak Park Works, Eastman Kodak Co.

Price only $1.25

JUST PUBLISHED

Now the foreman or supervisor may use motion study as easily as any everyday management process. With only a stop-watch and a simple, basic "formula", he can analyze any operation for improvement. Even operations to which it formerly was unprofitable to apply motion study may be analyzed by the simplified methods explained in this book. Here is a practical means of eliminating ineffective work and of spotting opportunities for methods improvement, with worthwhile cumulative benefits in greater production per hour.

Shows you:

—how to break down any operation into only 5 "work elements" common to all operations

—how to time an operation

—how to identify useful or wasted effort

—how to reduce repetitive motions by simple changes in layout and planning

—when to use simple fixtures for eliminating wasted effort

—how to train the operator in new methods

EXAMINATION COUPON

McGraw-Hill Book Co., 330 W. 42nd St., N. Y. C.

Send me Bailey's Motion Study for the Supervisor, for 10 days' examination on approval. In 10 days I will send $1.25, plus few cents postage, or return book postpaid. (Postage paid on cash orders.)

Name .....

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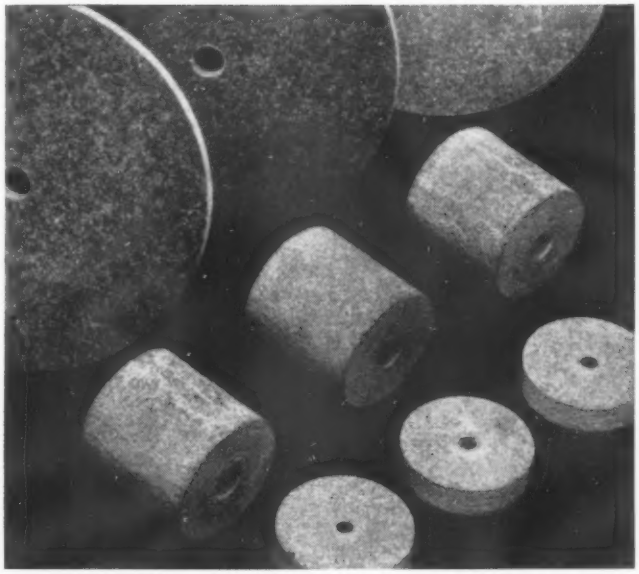
Company ..... A. 2-18-43

3 NEW WAYS

to speed output . . .



1 **"MX" WHEELS** combine light stock removal with finishing and polishing action. They are free-cutting and are to be used dry on any portable machine. For breaking down sharp edges on gears etc., finishing and polishing out-of-the-way places.

CARBORUNDUM PRESENTS 3 NEW "WEAPONS FOR PRODUCTION"

KEEPING pace with the war program, Carborundum has developed many new and novel coated abrasive products—Weapons for Production to speed output, insure high finishes and lower costs. Here are three of the most versatile and useful! They are particularly adapted for finishing and polishing out-of-the-way places on airplane engine parts and similar metal work.

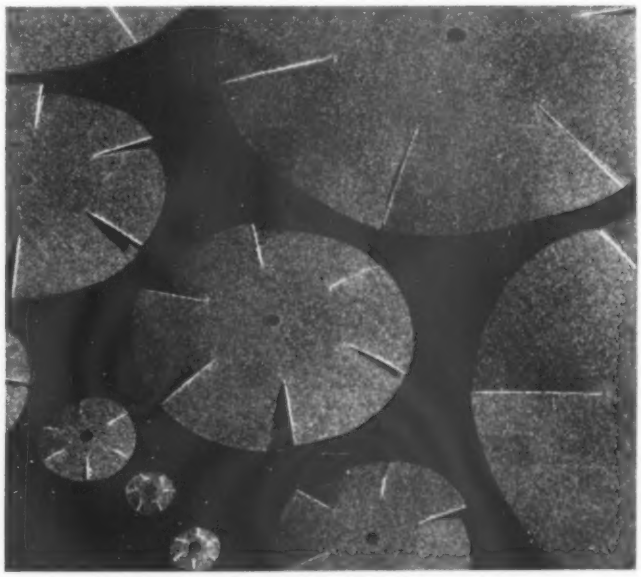
1. ***"MX" Wheels*** are fabricated from cotton fibres intimately intermingled with Aloxite Brand Aluminum Oxide or Carborundum Brand Silicon Carbide grain. They are made in six grades of hardness.

2. ***Cloth Cartridge Rolls*** are made in diameters from $\frac{3}{8}$ to 1 inch of tightly wound, glued strips of metal working abrasive cloth. Rolls are from 1 to 3 inches in length.

3. ***Multi-Slotted Discs*** afford a time-saving, cost-saving way to burr and polish the edges of holes in metal work. Produced in all necessary grits, in diameters from $\frac{1}{2}$ to 6 in.

CARBORUNDUM
ABRASIVE PRODUCTS

2 **CLOTH CARTRIDGE ROLLS** can be mounted on a spindle and used on a portable tool for finishing hard-to-reach surfaces. As abrasive surface wears down, cloth backing can be torn off to expose fresh layer of abrasive.



3 **MULTI-SLOTTED ABRASIVE DISCS** simplify the job of removing the burr and producing the true radius required on holes. Used in a portable power tool, the disc "cones" backward, finishing only the hole edge. When two discs are mounted together back to back, they can be used to finish both edges.

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

REG. U. S. PAT. OFF.

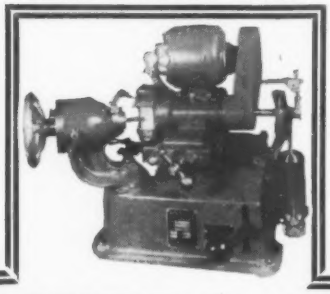
Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum and Aloxite are registered trade-marks and MX is a trade-mark of, and indicate manufacture by The Carborundum Company)

HYBCO
TAP GRINDERS

FOR ACCURATE SHARPENING OF
CHAMFER-FLUTES . . . SPIRAL POINTS

BELOW—BENCH TYPE GRINDER



★ Conserve tools . . . sharpen taps frequently and correctly . . . get longer tap-life and more efficient operation. Use a Hybco Tap Grinder . . . sharpens chamfer, flute and spiral points.

These features are distinct advantages for you:

HYBCO Tap Grinders sharpen taps even though center is destroyed.

All Lands sharpened with one rotation of the hand wheel.

Various sizes of heads may be furnished to give capacities machine screw to 1½" hand taps.

Machine is operated with any standard motor, electrical specifications to your requirements.

HYBCO Tap Grinders are furnished in three models; Bench, Floor and Floor with Exhaust System.

ALL TAPS HELD BY SHANK

HENRY P. BOGGIS COMPANY
1279 W. 3rd Street — Cleveland, Ohio

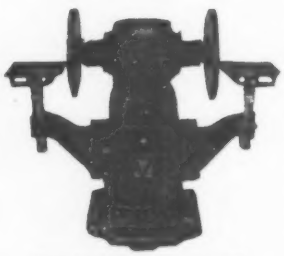
It takes a "Marschke" for Dependable Durability!

New Bottleneck Breakers

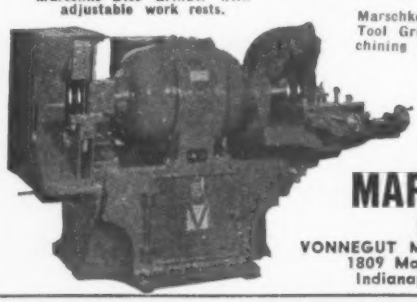
Marschke Spot Grinder or Buffer, accurately adjustable as to height and angle

SEMI-SPECIAL Marschke Grinders and Buffers are handling scores of special war production jobs efficiently. Armor plate and tank turret, grinders are the latest, 3 of the others, are pictured here. Every machine is typically smooth running, rugged and dependable, adapted from standard machines by Marschke engineers.

IF YOU HAVE a grinding or buffing bottleneck, ask for suggestions on a Marschke adapted to your special requirements. Or write for Catalog showing over 70 specifications of standard Marschke pedestal, stand and swing frame grinders and buffers.



Marschke Disc Grinder with adjustable work rests.



Marschke Roll Radius Tool Grinder, for machining rolling mill rolls.

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THE MARSCHKE LINE
VONNEGUT MOULDER CORP.
1809 Madison Ave.
Indianapolis, Ind.

MODELS 10-14 FEATURE THE *NEW* PATENTED

NO SPRAY NO SPLASH WHEEL GUARDS

"You're Dry when you grind Wet"

Guards are concealed, easily accessible, maximum light and operation freedom around the wheels.

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Other Hammond Grinders: "4" Combination Chipbreaker and Grinder; 6, 10A, and 20S Carbide Tool Grinders.

Hammond OF KALAMAZOO
CARBIDE TOOL GRINDERS
MODELS 4, 6, 10, 14, 20

Hammond Machinery Builders INC
★ ★ ★ 1618 DOUGLAS AVENUE ★ ★ ★
KALAMAZOO • MICHIGAN
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VERSATILE ACCURATE FAST } Sommerfeld BORING *and* TURNING LATHES

This 50 inch lathe provides the exclusive production-speeding advantages of boring and turning *at the same time!*

Close accuracy can be readily maintained; the 50 h.p. drive provides ample power for heavy roughing and fast finishing; three V's on the bed assure perfect alignment, less wear, heavier cuts, greater accuracy. The bed is heavily ribbed for rigidity, and provided in lengths of 20 feet to 100 feet. Available for delivery six weeks from date of order.

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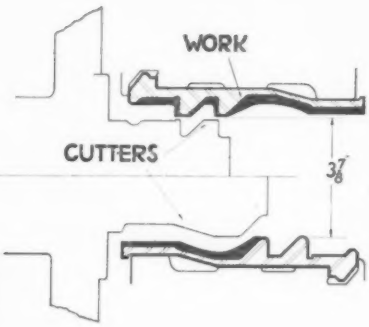
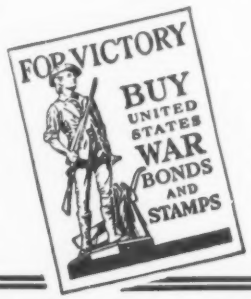
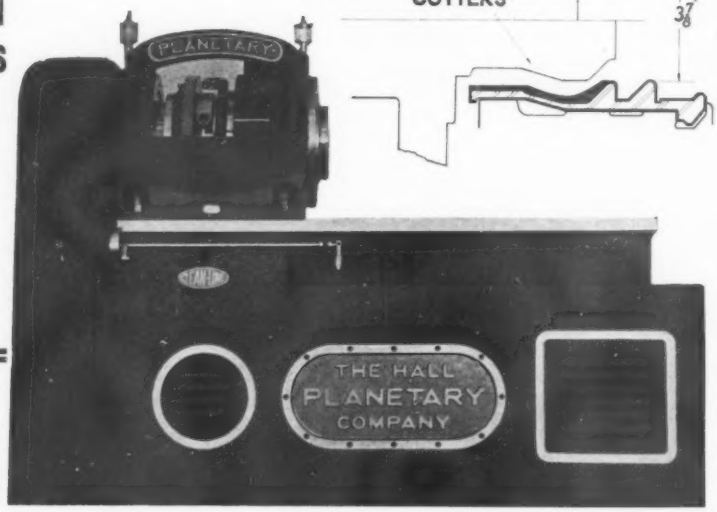
Internal form-milling or Planamilling is performed on this piece in two operations—reversing the work for the second operation.



EACH OPERATION in 10 MINUTES

Perfect location of shoulders. Concentricity maintained. Let us help you with your milling or threading problems.





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HELICAL TAPER PIN REAMERS

Scientifically made of selected steel under modern processes. Long lived, economical, accurate. Details on request.

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Drilling and Tapping Machines
(Automatic and Semi-Automatic)
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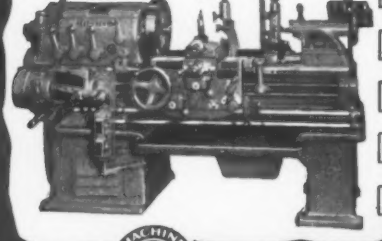

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VERTICAL MILLERS
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PRODUCTION SPEEDING
RADIAL DRILLS
AND
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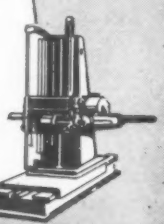
MACHINES



DETAILS ON REQUEST

THE CINCINNATI GILBERT MACHINE TOOL CO.
CINCINNATI, OHIO

You almost need asbestos gloves to read this book!

Hot off the press! Flash news on last-minute wrinkles and latest equipment in ARC Welding — the livest trade in America today and of post-war tomorrow. 516 pages—hundreds of pictures. $2 on 5-day approval, or C.O.D.

HOBART BROTHERS
Box A. M. 231 Troy, Ohio

HOT off the Press! Latest techniques, methods and procedures in ARC WELDING

5 DAYS Inspection or C.O.D.
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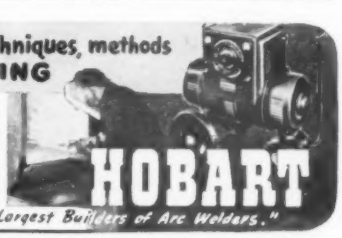
Order at Once!

It's a big 516-page book with 512 illustrations. Easy to read diagrams, charts, tables, shows the right way to weld different metals in all positions. Lessons Section is a boon to the beginner, a swell review for the expert. Here's a reference book you'll use daily.



HOBART "One of the World's Largest Builders of Arc Welders."

A flexible machine that is the last word in simplicity of operation

HI-SPEED
HONING and LAPPING MACHINE

for use with any standard make honing head

Illustrated is No. 0 Machine equipped for 36" stroke with 80" under the spindle.

HONES CYLINDERS up to 24" in diameter . . . with STROKES from 20" to 72" . . .

IDEAL FOR PRODUCTION JOBS INVOLVING:

Aircraft parts . . . Ordnance parts . . . Diesel engines . . . Compressors . . . Pumps . . . Internal combustion engines . . . Steam cylinders, etc.

Speed up war work involving internal cylindrical surfaces by utilizing a HI-SPEED Honing Machine. When used with proper honing head of any standard make, the HI-SPEED machine produces accurate, straight, round, smooth bores—amazingly fast.

Unique positive stop and dwell system makes it possible to stop the spindle without shock or impact at the bottom of each stroke, at any point within the stroke range and hold the spindle without reciprocation, at that point up to 1½ minutes. Ideal for "blind hole" honing and straight line lapping or honing.

All controls are located at the front of the machine at the operator's station . . . No ladders to climb . . . Stroke setting, hone withdrawal, short stroking at any point, changes in speed of reciprocation or rotation of the spindle made instantly from operator's station.

The HI-SPEED Honing Machine is made in 4 sizes, any one of which can be had with strokes up to 72"...Designed for use with any standard make of honing head.

Tell us your requirements—and our engineers will promptly furnish you with complete information, prices and early delivery dates.

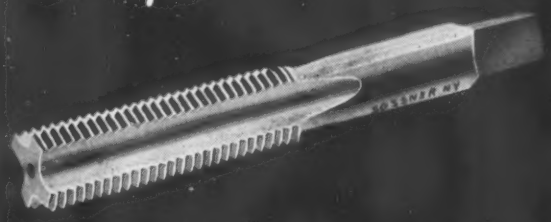
NOTE THESE SPECIFICATIONS:

Model No.	No. 0	No. 1	No. 2	No. 3
Stroke (standard)	20"	36"	48"	72"
Working Base Area (standard) Auxiliary Tables available	21" x 22"	31" x 31"	31" x 31"	48" x 54"
Height Under Spindle Nose (up) Added Height Available on Order.	48"	60"	75"	100"
Spindle Diameter	2⅛"	2⅛"	2½"	2⅞"
Spindle Speeds Through Gear Box	4	4	4	8
Main Drive Motor (standard)	7½ hp	10 hp	15 hp	20 hp
Coolant Pump Volume, Motor Driven	14 gpm	18 gpm	18 gpm	25 gpm
Maximum Bore possible to hone with standard spindle drive motor	10" Dia.	12" Dia.	16" Dia.	20" Dia.
Maximum Overall Diameter of Cylinder possible to place on standard base	18"	27"	27"	44"
Floor Area	44" x 60"	60" x 80"	60" x 80"	60" x 108"
Overall Height	11'6"	15'3"	18'3"	23'8"

NOTE: Under our new policy of distribution, sales territories are being assigned to financially responsible, established dealers in the machine tool field. A few excellent territories are still open, and dealers are cordially invited to write us relative to sales representation.

AUTOMOTIVE MAINTENANCE MACHINERY CO.
2100 Commonwealth Avenue, North Chicago, Illinois

there IS a difference in taps



4 good reasons why

SOSSNER taps last longer and cut more perfect threads

CUTTING . . . Sossner taps are carefully fluted and mirror polished to precise depth and width for maximum strength, minimum friction, and best cutting angle.

STRUCTURE . . . All Sossner taps are heat-treated in time-temperature-atmosphere controlled furnaces!

PRECISION GROUND FROM THE SOLID STOCK . . . All Sossner taps are ground to micro-finish from the hardened solid blank using the very latest equipment and our own newly developed methods.

ACCURACY . . . EVERY tap is measured with precision wires on master measuring instruments calibrated to .0001 in. Only the most modern and accurate equipment is used to check the form and lead.

TAPS AND GAGES OF AMERICAN NATIONAL AND BRITISH THREAD FORMS IN SPECIAL AND STANDARD SIZES

Write to SOSSNER, 161 Grand Street, N. Y. C. or 27 Broadway, Lynbrook, N. Y.

TAPS GAGES STEEL STAMPS CUTTING TOOLS

SOSSNER

"32 year reputation for precision workmanship."

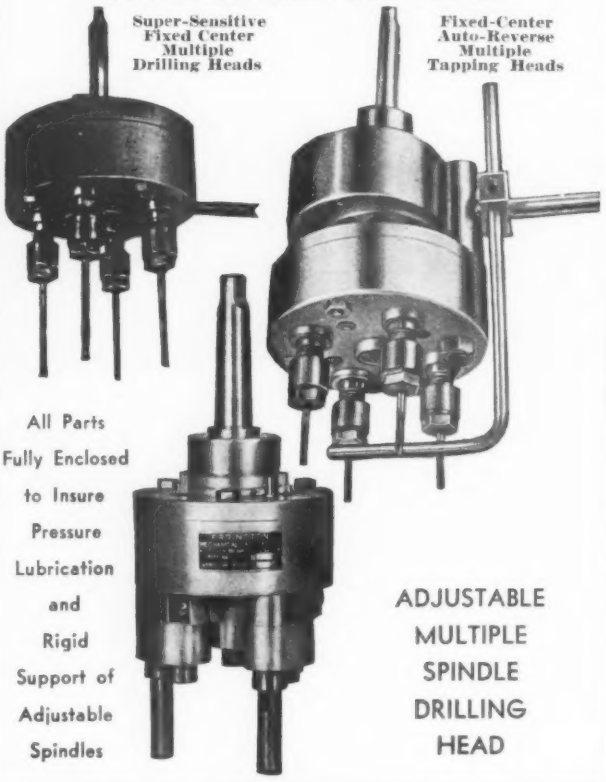
ERRINGTON

STAPLETON, STATEN ISLAND, N. Y.

MULTIPLE HEADS

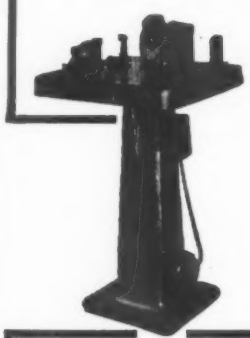
Super-Sensitive Fixed Center Multiple Drilling Heads

Fixed-Center Auto-Reverse Multiple Tapping Heads



All Parts Fully Enclosed to Insure Pressure Lubrication and Rigid Support of Adjustable Spindles

ADJUSTABLE MULTIPLE SPINDLE DRILLING HEAD



FASTER, MORE ACCURATE CUTTER GRINDING ASSURED with the "BARNES"

The Barnes Precision Cutter Grinder will grind formed cutters faster and preserve form absolutely. Cutter life is extended five to eight times over ordinary methods.

Utility and speed of the "Barnes" extends to the grinding of all types of cutters regardless of profile without changing existing cutter equipment. Form relieved cutters, sharpened on this machine become profile cutters. No high degree of skill is required to grind even the most complicated or irregular formed cutter.

Send for Descriptive Circular

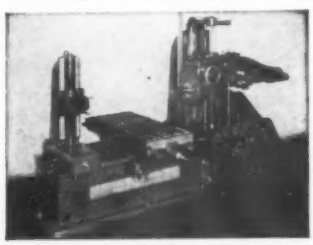
GENERAL MACHINERY CORP.

140 Federal St. Boston, Mass.

UNIVERSAL *Horizontal Boring Machine*

The only TRIWAY *Boring Machine Built*

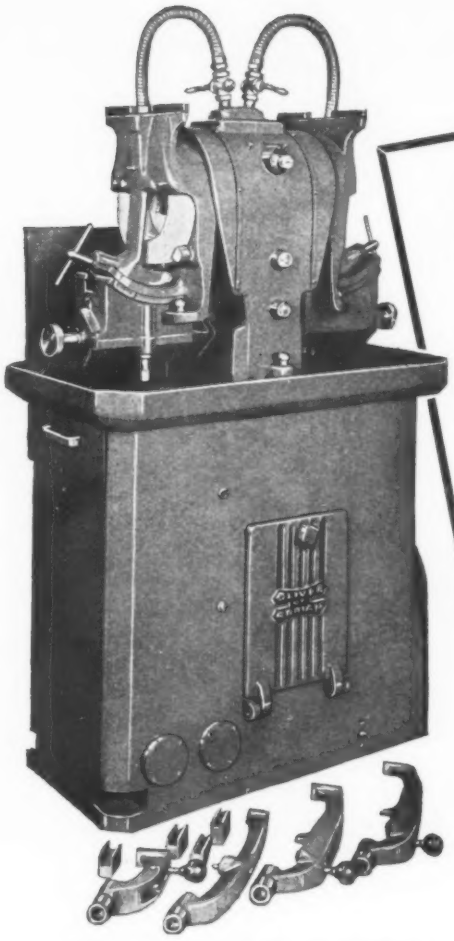
Made in 3" and 4" spindle sizes. Write for complete, detailed specifications.



Standard Universal 3" Spindle Machine

UNIVERSAL BORING MACHINE CO.

Hudson, Mass., U. S. A.



ACCURATE UNIFORM SINGLE POINT TOOL GRINDING

THE OLIVER TEMPLATE TOOL BIT GRINDER

Machine performance can be no better than the tools that do the cutting! Keep your single point cutting tools in condition for maximum war production efficiency with the Oliver Template Tool Bit Grinder. Using a master template, this Oliver Grinder produces correct top rake, accurate clearances and sharp cutting edges, assuring uniform results entirely independent of the skill of the operator. Heavy, rigid and vibrationless, it can grind carbide and other high speed tools rapidly and accurately.

No single factor is more important in maintaining the efficiency of a machine than the keenness of its cutting tools. Keep them uniformly accurate and free cutting and they'll be able to handle today's high pressure war production with economy, speed and accuracy. Used extensively in the Aircraft industry on special tooling for Propeller production. Also by many Cutting tool manufacturers.

Don't Neglect Your Toolroom It's the Backbone of Production!

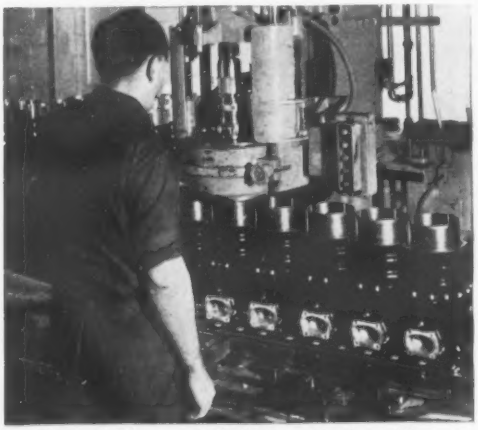
OLIVER INSTRUMENT CO.
1414 E. Maumee St. Adrian, Mich.

Oliver
OF ADRIAN

AUTOMATIC DRILL GRINDERS — TOOL AND CUTTER GRINDERS — DRILL POINT THINNERS — TEMPLATE TOOL GRINDERS — FACE MILL GRINDERS — DIEMAKING MACHINES

over 8 Metal-Working Results from Two Machines . . .

● BARNESDRIL honing machines offer four distinct metal removal features from one process. Honing removes stock faster after rough boring than size boring and reaming. It removes surface defects and inequalities. Final size is achieved through accurate control of hone pressures. Both roundness and straightness of bore are developed with *controlled* hones.

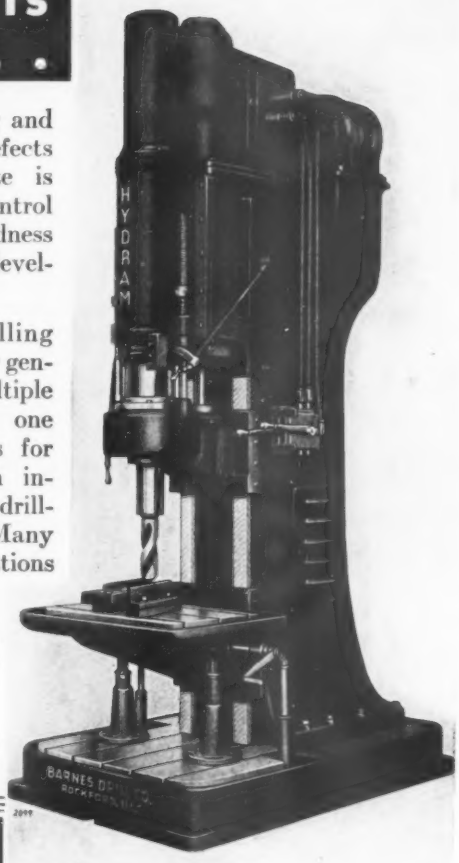


(Above) Honing 6-Cylinder Airplane Motor Blocks.

BARNESDRIL Hydram Drilling Machines can be furnished for general purpose drilling using multiple speeds and feeds, or, with one speed and multiple spindles for production drilling, or with inverted spindle for deep hole drilling, or for boring operations. Many other special tooling applications available.

Consult our engineers on your honing and drilling problems . . . no obligation.

FREE DATA: Write today for specifications and data covering the complete line of BARNESDRIL equipment. Ask for Bulletin A.



(Right) Vertical 4-H Hydram Drilling Machine with ¼" Twist Drill.

Barnes Drill Co. 830 CHESTNUT STREET ROCKFORD ILLINOIS, U.S.A.

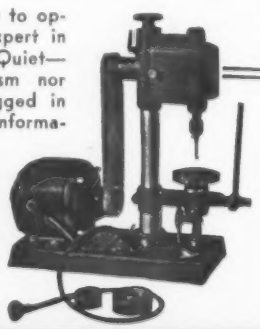
For Sensitive Tapping of Precision Work

HAMILTON-MUEHLMATT SENSITIVE TAPPING MACHINE

● Here's a high speed, sturdy little tapping machine which is especially adapted to precision tapping of light work. It is now being used very successfully for tapping parts for instruments, cameras, watches, clocks and business machines.

It has gained wide acceptance due to the high quality of work produced because of its particularly smooth operation without breakage of even the finest taps.

Mechanically simple and easy to operate, a man can become expert in an hour or so of operation. Quiet—no noisy reversing mechanism nor slinging of oil. Can be plugged in any light socket. For full information write for bulletin.

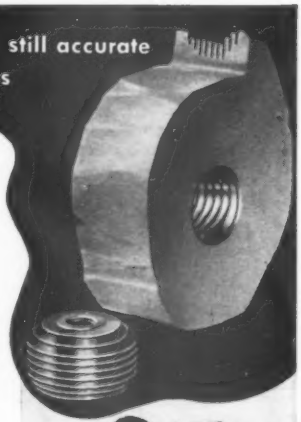


PERTINENT DATA

Capacity—From smallest and finest tap to 10-32 inclusive
Power—¼ H.P. 1750 R.P.M. Motor either CI-AC or compound DC
Tapping speeds approx 1200 to 2600 R.P.M.
Size of machine—16 in. x 7 in. x 22 in. high
Weight—Approx. 60 pounds

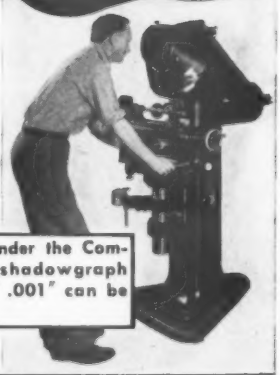
The Hamilton Tool Co.
830 NINTH ST HAMILTON, OHIO

This CIRCULAR FORM TOOL still accurate after successive regrinds



Midwest Circular Form Tools are special cutting tools made to produce exactly the intricate form required on any given part. The one illustrated has continued to turn out accurate pieces notwithstanding dozens of successive regrinds until only ¼" of the original circumference remains; production cost on the part, also illustrated, was reduced 14%.

When inquiring about Form Tools, send in parts prints, specify material to be cut, depth of cut, machine on which operation is performed. Ask for Bulletin 16D.



MIDWEST TOOL & MFG. CO.
2356 W. JEFFERSON AVE. • DETROIT, MICH.

Midwest tools are inspected under the Comparator—a highly sensitive shadowgraph device where a variation of .001" can be detected with the naked eye.

MIDWEST
manufacturers of
PRECISION METAL CUTTING TOOLS
for more than 30 years

Milling Cutters • Sleeves
Counter Bores • End Mills
Reamers • Special Tools
Form Tools • Adjustable Holders • Carbide Tipped Tools

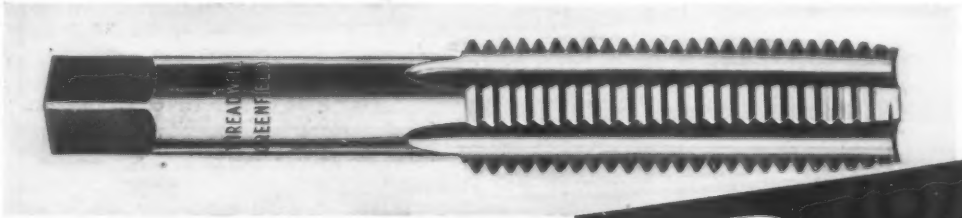
Your tap has outlasted any others which we have used

EXCERPT FROM CUSTOMER'S LETTER

A spinning finger of polished steel . . . cutting delicate chip curls . . . a thread is formed, accurate and true to the thousandth of an inch . . . dozens of threads, hundreds of threads, thousands of threads . . . a Threadwell Ground Thread Tap is setting new records for "holes per tap" *somewhere on the production front.*

In our files are dozens of recent letters of thanks that fall into two groups . . . letters from *purchasing* men in appreciation of the *personal attention* their orders for taps have received from Threadwell and its distributors, and letters from *production* men telling us how well our taps have performed in high speed tapping machines.

If your "bottle-neck" is threading tools, call on your Threadwell distributor.



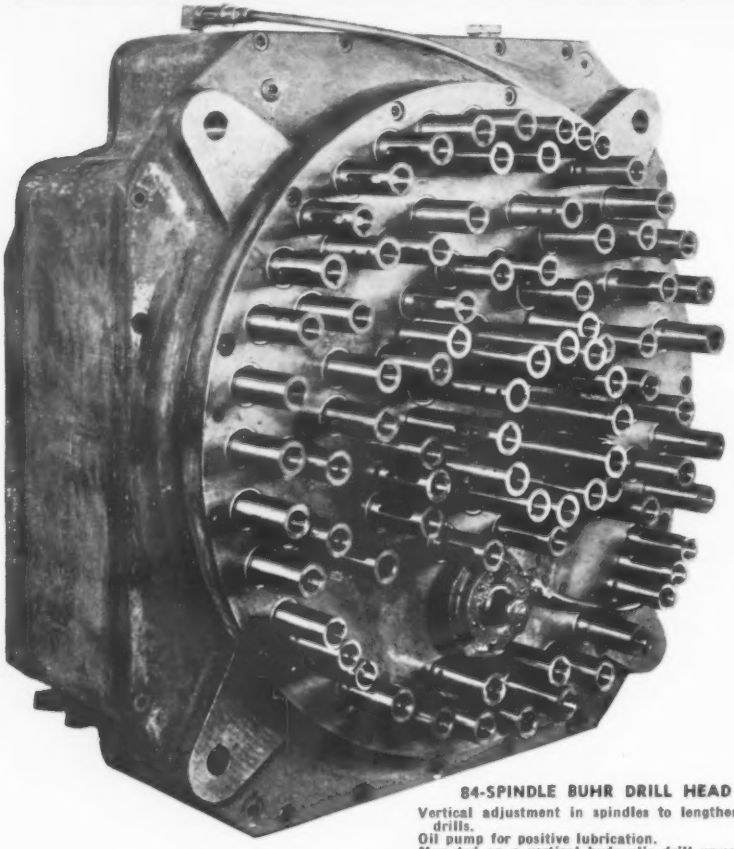
Threadwell

"TAPS OF DISTINCTION"

Sales Agents

CANADA: BRIDGE MACHINERY CO., MONTREAL
ENGLAND: SKYLUX LTD., LONDON

THREADWELL TAP AND DIE CO., GREENFIELD, MASS., U.S.A., FOUNDED 1902



84-SPINDLE BUHR DRILL HEAD
Vertical adjustment in spindles to lengthen drills.
Oil pump for positive lubrication.
Mounted on a vertical hydraulic drill press.
For drilling all holes in super charger cover.

NIGHT and DAY

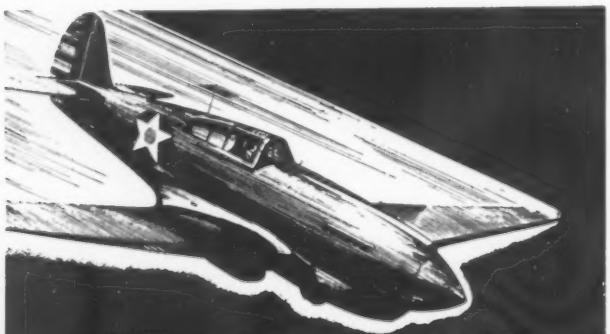
Buhr

MULTIPLE PRODUCTION DRILL HEADS

Are Putting Holes In Parts Used in Our All-Out War Effort

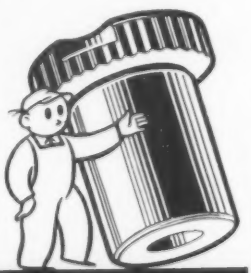
Similar applications of BUHR Multiple Spindle Drill Heads *will* speed your work. Give them a trial in your plant. Send us your blueprints — we'll make suggestions and recommendations on the use of BUHR-engineering and equipment.

BUHR MACHINE TOOL CO.
ANN ARBOR, MICH.
Specialists in Multiple Spindle Drilling, Boring, Reaming, Tapping Equipment



UNIVERSAL EMPLOYEES CONTRIBUTE $50,000.00 FOR U. S. FIGHTER PLANE

We are proud to announce that out of their own pockets, the employees of Universal have bought and paid for a $50,000.00 fighter plane for Uncle Sam. And this, mind you, they have done in addition to subscribing 20% of their pay for War Bonds.
We are proud too, of our precision-built Universal Drill Bushings that are straight and round and have superfinished bores for accuracy and long life. Write today for complete facts.



UNIVERSAL ENGINEERING CO.
FRANKENMUTH • MICHIGAN

EVERY-ISSUE "WHERE-TO-BUY" SECTION DISCONTINUED

This step is necessary to conserve paper, in compliance with WPB's restriction. Still available, however, is *American Machinist's* enlarged "Where-To-Buy" Directory, as published in the Jan. 21, 1943, "Annual." Reprints of this Metal-Working reference source may be obtained at no charge by writing READER SERVICE DEPT., AMERICAN MACHINIST, 330 W. 42 St., NEW YORK, N. Y.

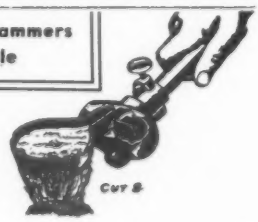
FAST NEW WAY TO STAMP NUMBERS AND LETTERS STRAIGHT

THE ACROMARK CORP.
H. O. BATES
ELIZABETH, N. J.

Remelt and Cast Your Lead Hammers with the Field Mould and Ladle

Save time and money—keep lead hammers in good condition at all times—easy to use—fast. Made in 7 sizes for hammers from 1 to 11 lbs. Write for details.
Also, Lead Hammers, sizes 1 to 15 lbs. always in stock.

JOHNSON TOOL CO., INC.
East Providence Rhode Island, U.S.A.



DRILLING ★ REAMING ★ TAPPING

FLEXIBILITY

THIS NEW LEMAIRE MACHINE will drill flanges having 3, 6 or 12 holes on any bolt circle diameter from 5½ to 10 inches

How it happened to be designed

THIS MACHINE was designed as a result of a problem that was brought to us by a prominent crankshaft manufacturer. He was drilling, reaming, and tapping on a radial drill. Because these operations were performed on a single spindle machine he felt his production was limited. The machine illustrated and described here shows how we licked the problem for him. Not only was his production stepped up considerably, but a great saving in labor hours was also achieved.

The designing and building of this machine is only one of the examples of the many diversified problems that are daily occupying our attention.

If you have any problems of production capacities of machines, let us help you work them out. We invite discussions with your engineers.

BUY WAR BONDS

THE UNUSUAL FLEXIBILITY of this machine recommends itself to manufacturers of crankshafts whose large volume production is divided into comparatively small runs of many different models.

The three spindles, spaced in a circle 120 degrees apart, can be moved in or out from center to any diameter from 5½ to 10 inches. Indexing of head makes possible the drilling of flanges having 3, 6, or 12 holes.

For drilling and reaming, spindle head movement is controlled by hydraulic circuit which allows rapid advance, coarse feed, fine feed, and rapid return.

Tapping is accomplished by disconnecting slide from hydraulic cylinder and using star handle to feed taps into work.

Four speed transmission provides wide range of speeds for drilling and tapping.

Thus, drilling, reaming, and tapping are all possible at one setting.

A special fixture at the right can be set up for any model crankshaft.

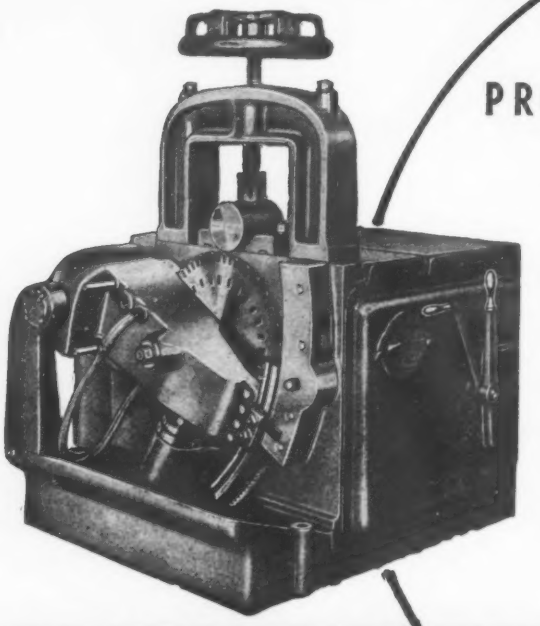
Because of its remarkable flexibility, this machine makes an ideal compromise between a single spindle setup and one having fixed spindle drill heads requiring individual fixtures for each piece of work. On this machine, setups for short runs are easily made and production is considerably increased over single spindle operations.

LeMaire TOOL & MFG. CO.

2659 S. TELEGRAPH ROAD ▲ DEARBORN, MICHIGAN

ENGINEERS AND BUILDERS OF PRODUCTION MACHINES

Save Time—Cut Costs with the PORTER-McLEOD PRODUCTION Cutting-Off Machine



This new 8" machine will step-up production and make such big returns in time and money savings in cutting stock for 3 inches up as to quickly return its first cost.

Here's the machine to break bottlenecks in cold metal sawing—a machine that's versatile, fast, powerful and accurate, yet easy to control and economical to operate. You can put it to work on single pieces or by nesting of bars or shapes, handle multiple unit cutting up to the capacity of the machine.

The outstanding speed of this machine is made possible by features which protect blade and work and save power. For example, due to the leverage exerted on the blade, which is supported close to its rim and pulled through the cut, buckling of the saw is prevented and accuracy as well as straight cuts assured. Friction feed insures against blade breakage.

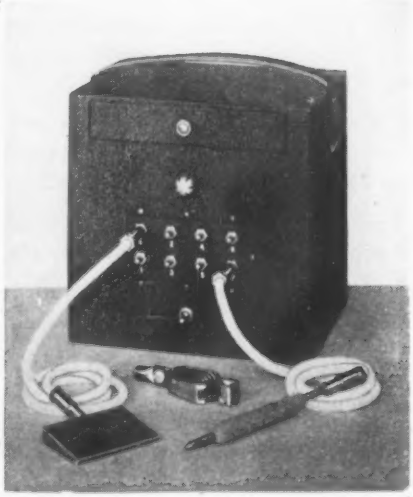
The standard feed of this machine is 3 inches and this can be stepped up for brass and non-ferrous metals.

Get all the facts about this new production machine by writing today for illustrated bulletin.

PORTER-McLEOD MACHINE TOOL CO., INC.
HATFIELD, MASS., U. S. A.

MACHINE TOOL COMPANY

MARK IRON, STEEL and CARBIDES



The Original
Etchgraph
Way

Mark parts in process, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides—quickly—plainly.

Three sizes to meet all requirements.

Write for circular and prices

BREWSTER-SQUIRES & CO.
50 CHURCH ST. NEW YORK, N. Y.

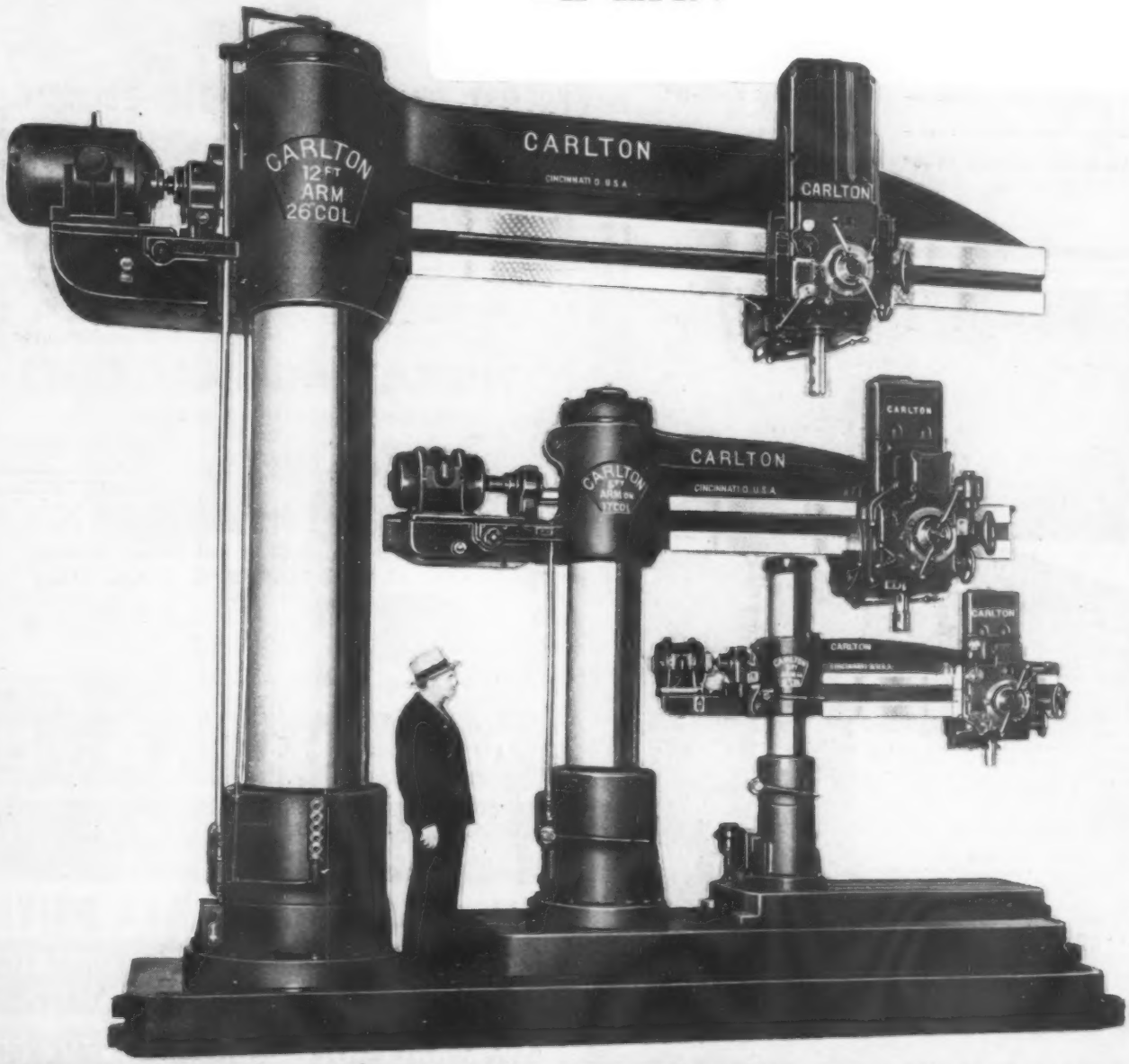
Filtaire PORTABLE DUST COLLECTORS

The Filtaire Portable Dust Collector is a completely self-contained unit that will soon pay for itself in dozens of spots in your shop. It stops the damage caused by dust and dirt from grinding and polishing operations. The Filtaire is equipped with a replaceable Dustop filter which is inexpensive and absolutely fireproof. Plug the Filtaire into any 110-volt line and it's ready to go. Write for descriptive folder.

EDWARD BLAKE COMPANY
634 COMMONWEALTH AVE., NEWTON CENTRE, MASS.
BLAKE TAP GRINDERS—FILTAIRE PORTABLE DUST COLLECTORS—AMERICAN TOOL HOLDERS — BLACK DIAMOND PRECISION DRILL GRINDERS — L & D HIGH SPEED DRILL PRESSES

CARLTON *Radial Drills*

- Low Hung Drive to Spindle
- All Power Driven Parts Running in Oil
- Gears Hardened Alloy Steel with Ground Teeth
- Constructed On Unit Principle
- Concentrated and Convenient Control
- Quit Running At All Speeds
- Made in Sizes 3' Arm to 12' Arm and Column Diameters of 9"—11"—13"—15"—17"—19"—22" and 26".



THE CARLTON MACHINE TOOL COMPANY

CINCINNATI - - - OHIO

POWER, VERSATILITY AND OPERATIVE CONVENIENCE TO SPEED ARMAMENT WORK *are assured by the* No. 2 AMERICAN PLAIN MILLING MACHINE

OUTSTANDING FEATURES

. . . spindle of chrome nickel steel, heat treated, accurately ground to size, running in heavy phosphor bronze bearings compensated for wear and equipped with alemite lubrication fittings.

. . . infinite spindle speed variation with machine in operation; a single direct-reading dial control in easy reach of operator provides for instant variation.

. . . longitudinal and transverse power feed; vertical hand feed.

. . . all operating levers and controls located for convenient manipulation.

. . . table working surface arranged with large oil pockets and with three T-slots.

. . . standardized flanged spindle nose with No. 40 taper.

. . . U.S. Vari-Drive ball bearing motor in base, with drive through multiple V-belt.

CONDENSED SPECIFICATIONS

Table Working Surface — 46" x 10½"
Longitudinal Power Feed — 25"
Transverse Power Feed—9"
Vertical Hand Feed—19"
Geared Feeds—16
Range per revolution of spindle .005" to .212"
Spindle Speed Range—25-500 R.P.M. (Infinite)

INVESTIGATE!

PROMPT SHIPMENT ON HIGH PRIORITIES

J. L. LUCAS & SON, INC.
BRIDGEPORT, CONN., U. S. A.

● Important new developments on this machine make it adaptable to handling bigger jobs and insure the utmost in rigidity and accuracy. Improvements include:

. . . table size increased to 7" x 17½"
. . . three T-slots instead of one.
. . . longitudinal table travel increased to 10" and cross travel to 6" without running out of ways.
. . . table hand wheel on left.
. . . maximum distance table top to spindle nose increased from 9" to 11½"
. . . column ways shortened at lower end to provide more clearance
. . . table thickness increased by ½" to provide greater rigidity

● *Write for Bulletin M giving complete features and detailed specifications.*

LINLEY BROTHERS CO.
664 State Street Extension
BRIDGEPORT, CONN. U.S.A.

DIE HEADS Self-Opening **TAPS** Collapsible

THREADING MACHINES
MURCHEY MACHINE & TOOL CO.
951 Porter St. Detroit, Mich.

LUCAS "PRECISION"
Horizontal Boring, Drilling and Milling Machine
THE LUCAS MACHINE TOOL CO.
NOW AND ALWAYS OF
CLEVELAND
OHIO, U. S. A.

MILLHOLLAND

Automatic **DRILLING - BORING MILLING - TAPPING** Units

½ to 20 HORSEPOWER DRIVE

AUTOMATIC and SEMI-AUTOMATIC PRODUCTION MACHINERY

W. K. MILLHOLLAND MACHINERY CO.
Indianapolis, Ind.

Now Ready . . . the new 1943 Catalog of SNYDER Machine Tools for better, faster production

Something more than just a catalog of machine tools is this new book which we have just published. In many ways it demonstrates how the principle of building special machines for the automobile industry has been applied by Snyder to designing machines, tools and fixtures for the great war industry. The book not only illustrates and explains some of these special machines, but it also shows how Snyder standard machines can be readily equipped to do the work of special machines. Consequently, we believe, the catalog is a good reference book for the engineering department that is striving for higher production and lower unit cost. Use the coupon below to request your copy.

FOR VICTORY
BUY UNITED STATES WAR BONDS AND STAMPS

BUY WAR BONDS . . .
the Sky's the Limit

SNYDER
TOOL & ENGINEERING CO.
3400 E. Lafayette Ave. • Detroit

designers and builders of machinery for HIGH production at LOW unit cost

Send now for this instructive catalog

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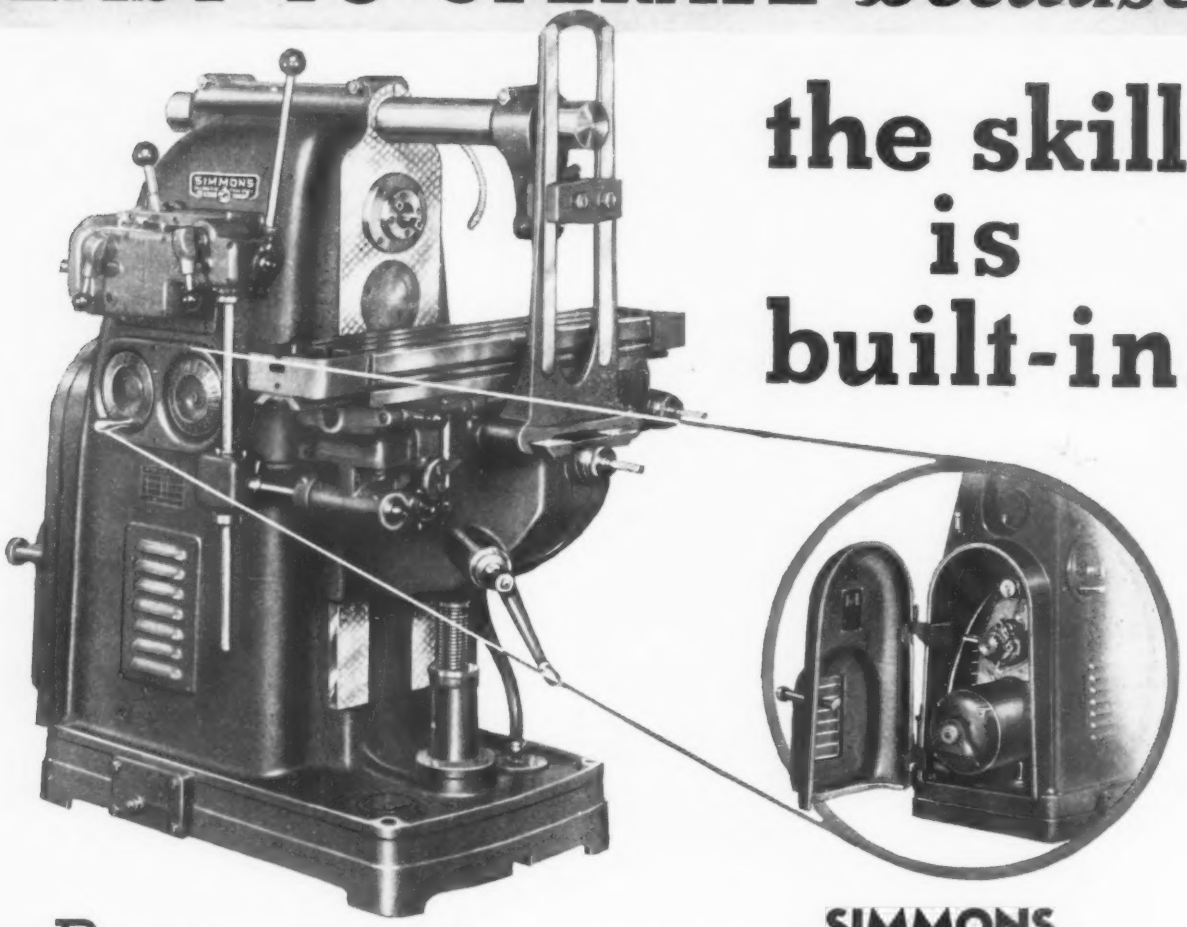
TOOL & ENGINEERING CO.
3402 E. Lafayette Ave.,
Detroit, Michigan

Please send me a copy of your Catalog No. 43

Name .....
Company .....
Street .....
City, State .....

EASY TO OPERATE *because...*



the skill is built-in!

Because inexperienced operators learn to produce small, high-precision parts quickly, Simmons No. A-1 Micro-Millers will help solve your skilled-labor shortage. These sturdy, versatile milling machines are equally efficient on long production runs or small-lot work requiring frequent set-ups.

Through *Micro-Speed*, a unitized A.C. motor and variable speed drive mounted on a hinged bracket in the column, spindle speed changes are made while the spindle is in operation. A direct-reading index plate shows the speed obtainable at each position of the Selector Dial. Thus the operator can easily determine the spindle speed best-suited to the work and cutting tools. The combination spindle clutch and brake bring the spindle to rest quickly.

A rack and worm wheel provide exceptionally long travel to the table, the entire surface of which may be used with power feed. The longitudinal feed range is 34"; cross, 8"; vertical, 18½". All movements of the table are indicated by micrometer dials. *Write TODAY for illustrated bulletin with complete details and specifications.* SIMMONS MACHINE TOOL CORP., *Main Office:* 1759 N. Broadway, Albany, N. Y. *New York Office:* 149 Broadway.

SIMMONS MICRO-MILLER

SIMMONS MICRO - SPEED DRIVE, mounted in the column (see inset), provides infinite speeds to the spindle throughout both the low—56 to 170 RPM—and high—210 to 630 RPM — ranges. The spindle drive is obtained through standard separable link Vee belting.

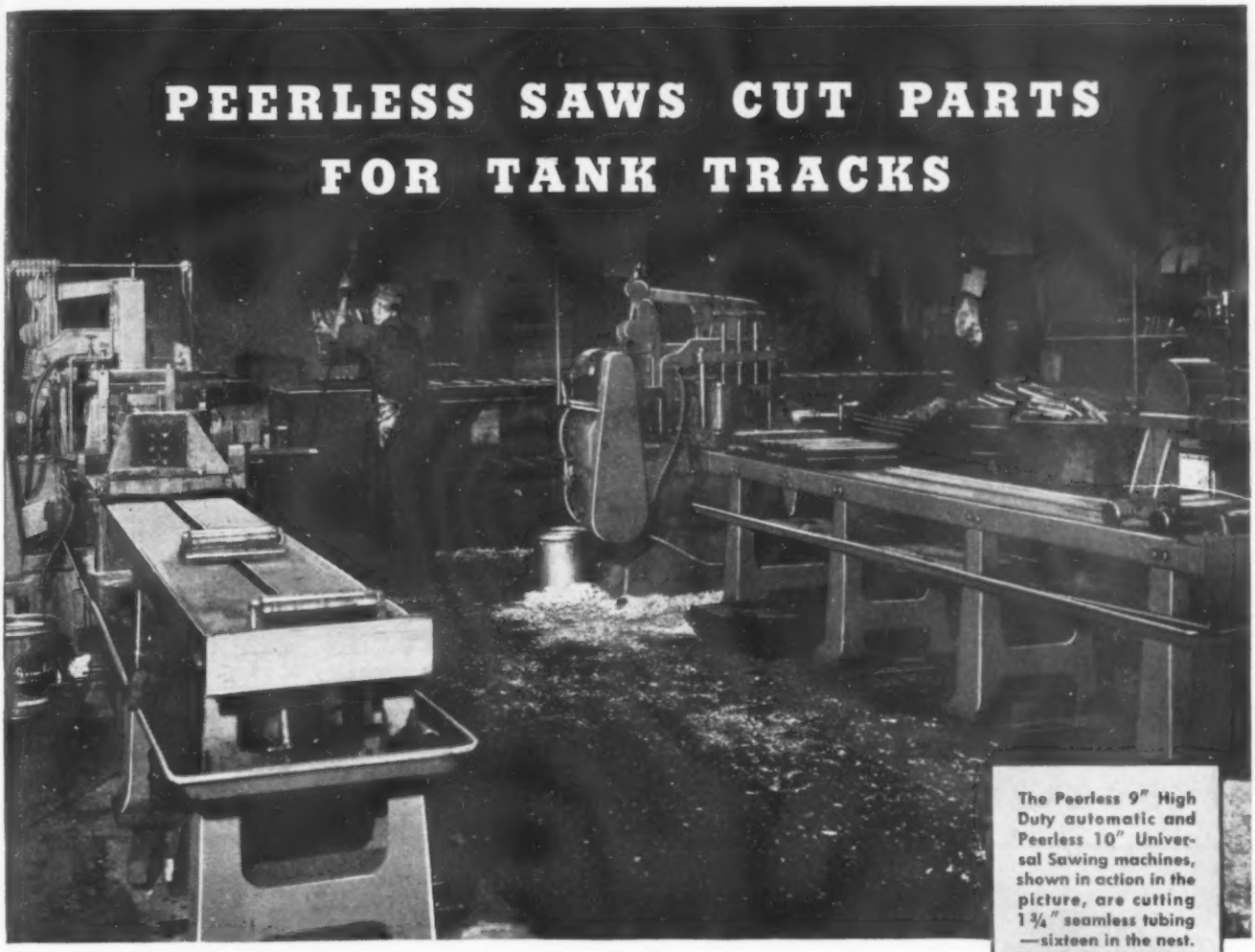
QUICK DELIVERIES TO PRIORITY HOLDERS

Awarded to the employees of the Simmons Machine Tool Corporation on August 20, 1942

SIMMONS

LATHES · TURRET LATHES · MILLERS · PLANERS · 6" BAR BORING MACHINES

PEERLESS SAWS CUT PARTS FOR TANK TRACKS



The Peerless 9" High Duty automatic and Peerless 10" Universal Sawing machines, shown in action in the picture, are cutting 1¾" seamless tubing —sixteen in the nest. Between 1800 and 2000 square inches are cut with a single high-speed steel blade.

THEY SET THE PACE WITH AUTOMATIC, ACCURATE SAWING

CUTTING seamless tubing for tough tank tracks demands fast-cutting Peerless accuracy and Peerless blade control.

Peerless speed, combined with accuracy, gives the combination essential to thrifty use of metals and record-breaking production. Peerless is the only machine with the FOUR-SIDED SAW-FRAME. The frame surrounds the blade and the work. The Peerless BACKING-PLATE BLADE-SUPPORT permits the application of maximum feed pressure, without causing excessive blade wear.

Automatic micrometer-set length gauging — done hydraulically — is an exclusive Peerless development. It automatically fixes the length of the cut, with minimum stub-end waste.

There are other important, exclusive Peerless features. Send the coupon below for a quick, positive, economical solution of your metal-cutting problems.

PEERLESS MACHINE COMPANY
1600 JUNCTION AVENUE • RACINE, WISCONSIN

PEERLESS MACHINE COMPANY, Dept. AM-243, Racine, Wis.
Mail cutting time estimate for.....

- ☐ Mail catalog on Hydraulic type Saw for High Production Cutting
- ☐ Mail catalog covering Vertical type used for Die Block Work
- ☐ Mail catalog on Mechanical type Saw for production cutting
- ☐ Mail catalog on general utility and maintenance Saws

Company.....
Individual.....
Street.....
City.....State.....

Peerless
THE ONLY METAL CUTTING SAW WITH FOUR-SIDED SAW-FRAME AND BACKING-PLATE

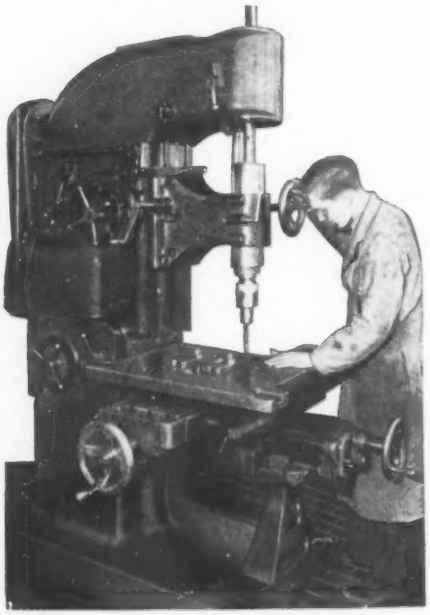
Fast ACCURATE *Sawing* DEMANDS PEERLESS BLADE CONTROL

Valuable performance for these times

- **SPEED AND ACCURACY FOR LIGHT MILLING**
- **POWER, AND RIGIDITY FOR HEAVY CUTS.**
- **DIFFICULT AND UNUSUAL PARTS HANDLED QUICKLY AND ACCURATELY WITHOUT SPECIAL EQUIPMENT.**
- **LIMITED AND SPECIAL PRODUCTION DONE ECONOMICALLY AND QUALITY MAINTAINED WITHOUT SPECIAL TOOLING.**
- **INTERNAL AND EXTERNAL MILLING DONE AT ONE SETTING.**

ALL-PURPOSE KNIGHT-Millers

The KNIGHT Miller greatly reduces the most expensive element in tool room operation—time waste in set-up work.



There is but a short time required to make a set-up, particularly a difficult one—the need for additional set-ups is practically eliminated — where required they are most simple to make.

★ The flow of work into your plant or shop now may call for an exceptional range of milling—drilling—boring—facing. Those equipped with the KNIGHT MILLER all-purpose milling machine handle this work faster, more conveniently, and more accurately.

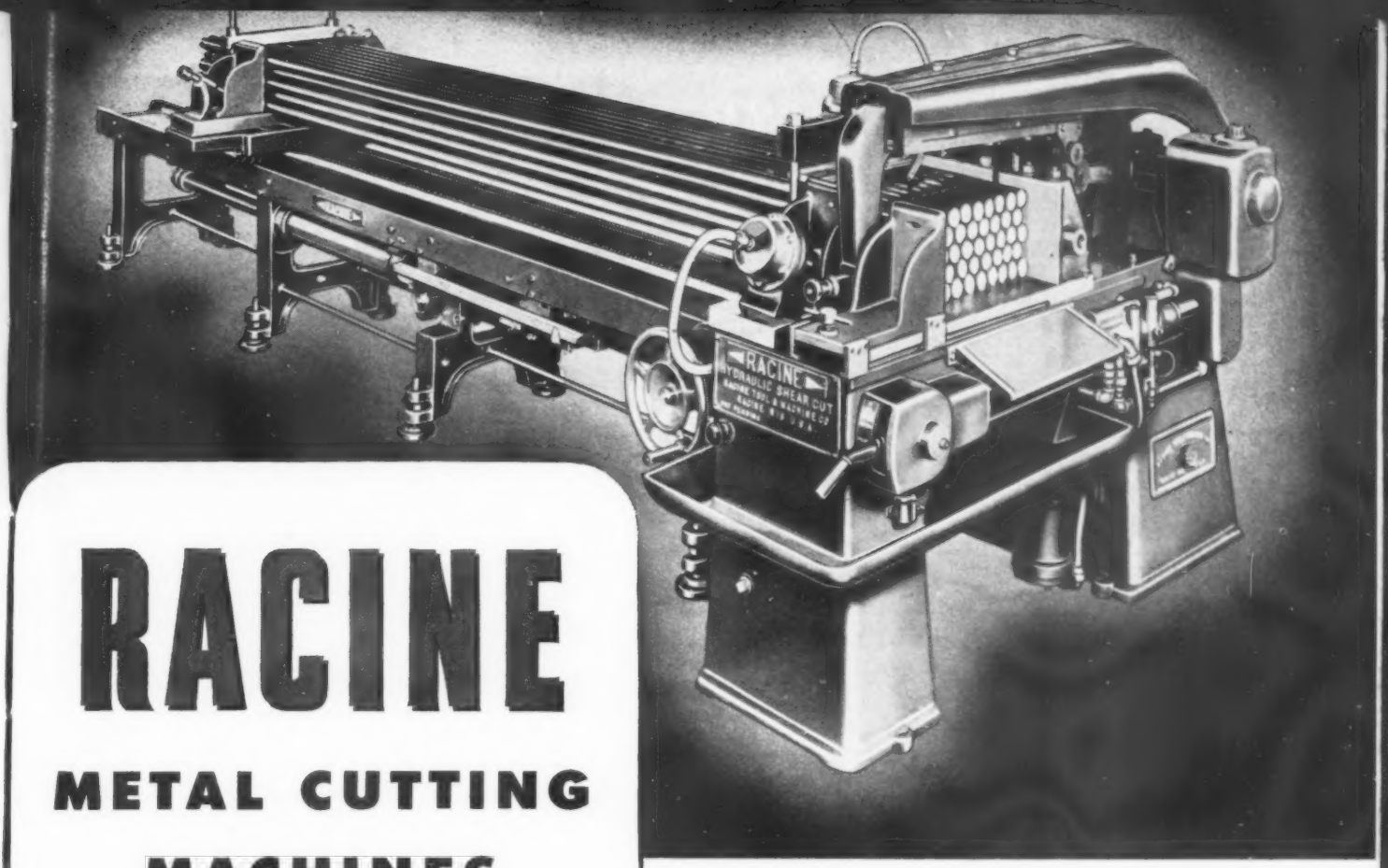
Included in the wide ability range of the KNIGHT MILLER is step milling which is made easy by getting vertical adjustment on spindle. Profiling, boring, and slot-milling is all done at one setting. Precision boring is done, using dial indicators for accurate locating. Rigid spindle makes possible deep end milling. Jig boring is possible because of dial indicators.

Costs on experimental work are greatly reduced because you can machine many jobs completely on this one machine and handle difficult operations without special equipment.

KNIGHT VERSATILE MILLERS ACCURATE-RIGID

IMMEDIATE DELIVERY
SUBJECT TO PRIOR ORDER

W. B. KNIGHT MACHINERY CO.
• ST. LOUIS, MISSOURI •



RACINE

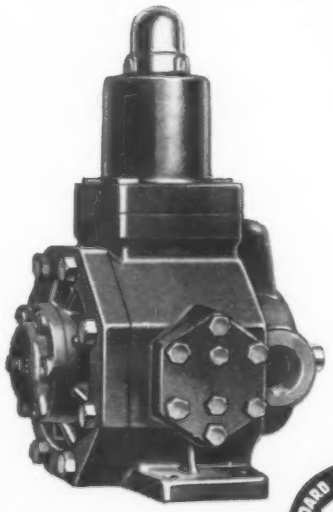
METAL CUTTING MACHINES

Standard for Higher Quality and Greater Precision

THESE Hydraulic Fed and Controlled Metal Cutting Saws with oil cushioned operation save blades, permit faster cutting and heavier cutting feeds. Designed and built for modern production—cutting time and costs can now be accurately determined.

Modern designing of Racine saws produces these outstanding features. Hydraulic control allows complete range of feeds—positive progressive and self-compensating progressive. Single lever control—inexperienced help can operate. Extra heavy pivot shaft and wide pivot bearing construction in arm of Saw Guide prevents cocking or binding strain in bearings and ways.

Racine's complete line includes models for general purpose and production cutting in a wide range of prices and sizes. Capacities 6″ x 6″ to 20″ x 20″. Automatic Stock Feed Machines, as illustrated, are also available.



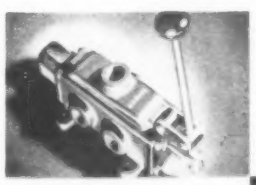
RACINE *Variable Volume* HYDRAULIC PUMPS

A Modern Source of Hydraulic Force

Speed up the production of your power operated equipment with Racine Variable Volume Oil Hydraulic Pumps and Valves.

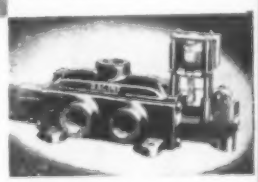
Pressure from 50 to 1000 lbs. per sq. in. for holding, pressing, clamping, feeding and forming operations.

No relief valve needed. Pumps only the amount of oil you require to do the job. Exclusive "Vane Type Variable Volume" feature. For vibrationless action in modern machine design. Capacities 0-12, 20 and 30 gal. per minute.



Four-way Hydraulic Valves are available with stem, lever, roller, latch, foot treadle and solenoid operating devices. Various porting arrangements can also be furnished to suit your requirements.

Racine's exclusive "Sleeve Type" Hydraulic Valves have balanced pistons. Made in ⅜" to 1½" standard pipe sizes. Continuous bearing and sealing surface—piston cannot sag—always in alignment—insuring longer valve life.



Our Engineering Department will be glad to help you work out your hydraulic application problems. Address your request for complete information to Dept. A M.

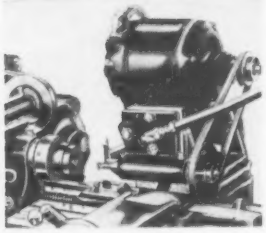
RACINE TOOL and MACHINE COMPANY

STANDARD FOR QUALITY AND PRECISION

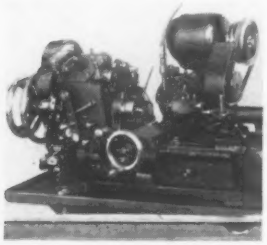
RACINE, WISCONSIN · U. S. A.

WALTHAM THREAD MILLERS

put precision thread milling on a production basis



Waltham Thread Miller equipped with Internal Threading Attachment.

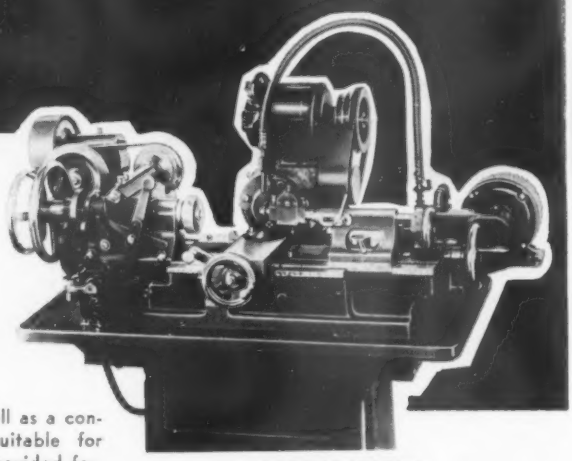


Machine equipped with Relieving Attachment.

These improved machines are fast, accurate and versatile. They will mill all standard forms of threads quickly, conveniently and accurately, cutters for which are available from Waltham.

Standard design includes three motors (one each for speed, feed and oil), a feature which permits individual speed change and reverse for both cutter and the work as well as a constant speed for the pump. Speeds suitable for either brass or steel or both are easily provided for. All motors are controlled from one convenient station.

Extra equipment available includes: plain and compound taper attachments, translating gears for cutting metric leads, metric lead screw, relieving attachment, special heads for internal and multiple cutter threading, and automatic cam operation, special equipment for cutting long lead.



SPECIFICATIONS

Swing over carriage 3"
Capacity (Diameter of work) 2" or smaller
Thread length (work held on centers) 8¾"
Thread length (work held in spring chuck at one end) 10"
Diam. hole through spring chuck ⅝"
Dia. hole through work spindle ¾"
Floor Space 48" x 34"
Motors: 1/3-1/4 and 1/6 HP

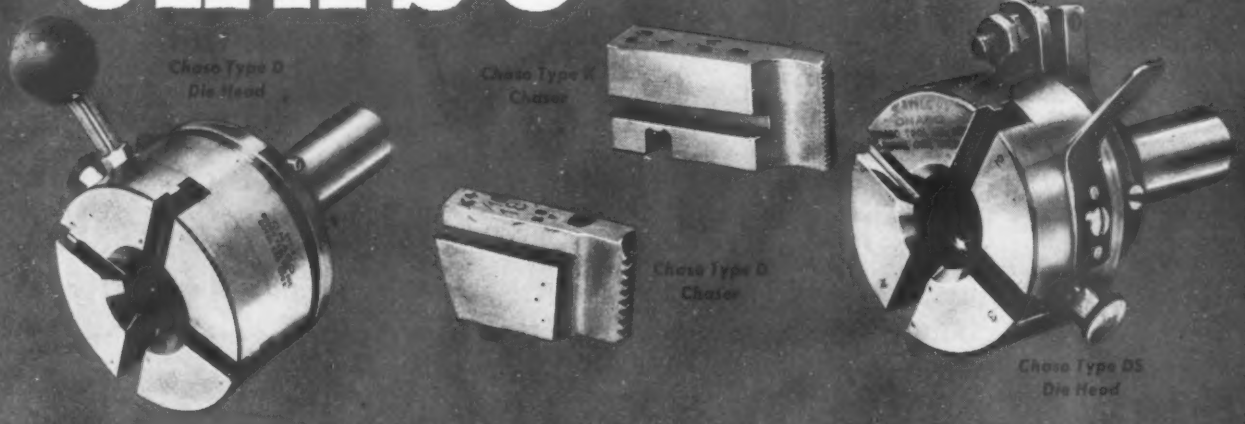
SEND FOR DESCRIPTIVE LITERATURE GIVING COMPLETE DETAILS.

WALTHAM MACHINE WORKS

WALTHAM MASS.

WALTHAM TRADE MARK REGISTERED U S PAT OFF

CHASO Threading Tools



IT'S *Chaso* FOR CHASERS!

We make chasers for most of the well-known makes of self-opening die-heads.

- CHASO CHASERS must prove satisfactory in order to fulfill the CHASO guarantee for quality, workmanship and accuracy. It means also that users of CHASO THREADING TOOLS *must* obtain better service in terms of more threads of closer accuracy between grinds.
- CHASO production methods assure the satisfactory performance of CHASO CHASERS AND DIE HEADS. Write for our catalog.

CHASO TOOL COMPANY, Inc. *Royal Oak, Michigan*

The VERNON NO. O MILL

BENEATH the compact pedestal of this No. O Vernon is housed a *lot* of bite . . . ! One full horsepower efficiently transferred through a variable drive takes heavy cuts in the toughest steel without stalling . . . without chatter . . . and in a minimum of time.

The husky Vernon No. O Mill is simply constructed and easily operated, with emphasis of design placed on PRODUCTION! Get your folder with complete description by writing today!

VERNON VERTICAL MILLING HEAD

Rigidly supported on overarm. Rotates 360° in longitudinal plane, 25° each side of vertical in transverse plane. Powerful, accurate, flexible multi-angle milling without changing set-up.

MACHINERY MANUFACTURING COMPANY
1915 EAST 51 ST., VERNON — LOS ANGELES, CALIFORNIA
Vernon Line of **HORIZONTAL MILLS, VERTICAL MILLS and JIG BORERS, SHAPERS and GRINDERS**

ADAMS

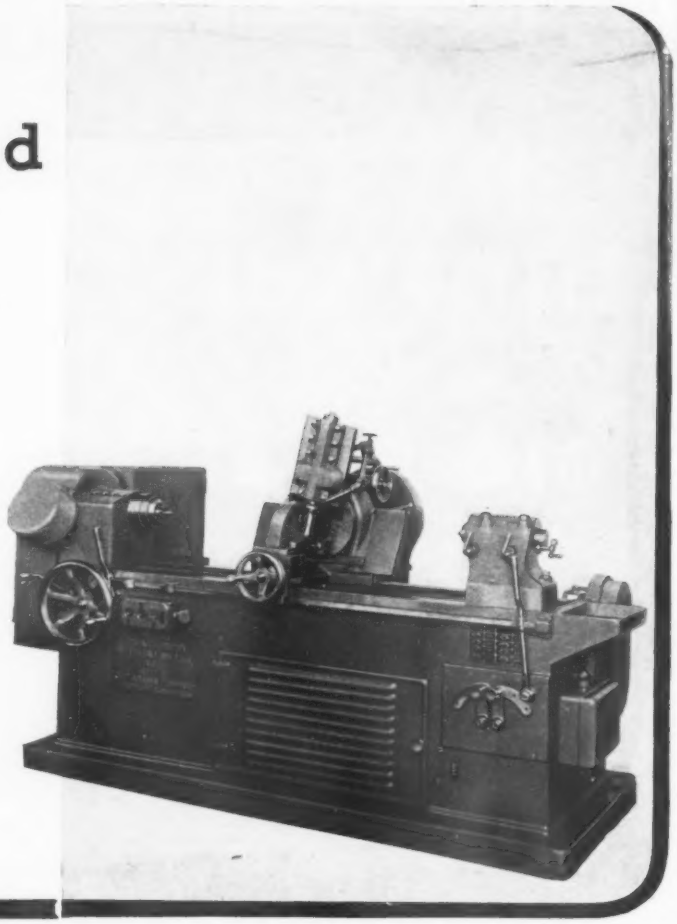
Gear Hobber and Thread Miller

Here is a versatile machine that will help you to produce precision gears on an uninterrupted schedule.

It excels in the production of multiple splined shafts, and it hobs spur gears and helical gears of any angle.

In addition, it functions as a thread miller on single or multiple threaded worms, lead and feed screws, etc.

Our catalog No. 501 contains full information. Do you want a copy?



THE ADAMS COMPANY

Est. 1883

1905 Bridge St. Dubuque, Iowa

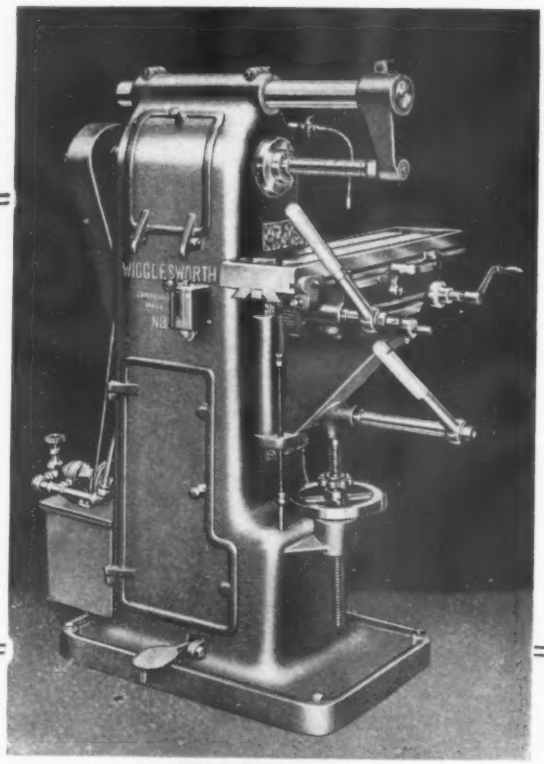
SMOOTH STEADY POWER FEED ASSURES FINE FINISH on the No. 3 WIGGLESWORTH HIGH SPEED MILLER

Modern in every detail of design, the longtitudinal power feed on the No. 3 WIGGLESWORTH Small Parts Milling Machine provides a steady, smooth feed which can be depended on to give fine finish, free from chatter marks. Drive is through a pair of 45° angle spiral gears in the saddle to the worm.

The feed gear mechanism consists of a set of planetary gears. Drive to table is taken from a 3-step cone pulley on rear of spindle to a 3-step pulley in feed shaft. Planetary gears provide proper speed reduction to spindle to give proper feed rates to table. Six rates of feed are obtainable.

Other features of this new machine are fully described and illustrated in literature sent promptly on request.

IMMEDIATE DELIVERY WITH HIGH PRIORITY



SPECIFICATIONS

Lever feed to table—10"
Crank or power feed to table—20"
Transverse feed—5¼"
Vertical motion to knee—10"
Dist. spindle to table—10"
Working surface of table—7"x20"
Hole in spindle—13/16"
Taper hole in spindle—Standard No. 40
Number of feeds—6
Number of speeds—6—from 150 to 800 R.P.M.
Floor space—42"x44"
Height—54"

WIGGLESWORTH MACHINE TOOL CO.

195 Bent St., Cambridge, Mass.

FOR PRECISION WORK · · ·
IN VOLUME LOTS · · ·
AT LOWER COST

"Ask ETNA about Swaging"

● Here is a job done on a standard ETNA Swaging Machine by a prominent midwestern manufacturer in turning out 20 m.m. shells. The operation consists of swaging a narrow copper band around the shell. This is but one of countless operations on which ETNA Swaging Machines can reduce costs.

FOR EXAMPLE—

Swaging can, in one step, often handle jobs that formerly represented two and three separate operations. Moreover, swaging improves the structure of metal—makes it stronger, harder, more dense and more elastic. Swaging also gives the work a burnished surface which is more resistant to wear and to corrosion.

Parts made by Swaging can be held within limits of plus or minus two to three thousandths of an inch in diameter, and frequently can be turned out on fully or semi-automatic machines at a high production rate.

Remember this: ETNA Swaging Machines can be quickly and easily converted to normal peacetime operations. ETNA Swaging Machines are built in ⅜" to 8" diameter capacities—1" to 18" die lengths. Larger units built to your order. Write, wire or phone —"Ask ETNA About Swaging" today!!

IF IT'S A QUESTION OF TAPERING, SIZING OR REDUCING OF ROUND SOLIDS OR TUBING...
"Ask ETNA About Swaging"

ETNA
MACHINE COMPANY
TOLEDO OHIO

HIGHLY EFFICIENT IN ACTION!

NICHOLS Hand Miller

Built to keep pace with "around the clock" production, the NICHOLS HAND MILLER combines time-saving efficiency with high cutting speeds in the precision milling of small parts.

Low cost investment in the NICHOLS HAND MILLER will pay high dividends on your production line where speed with accuracy is essential.

Longitudinal Feed, 10". Transverse Feed, 7". Vertical Feed of Knee, 13½". Vertical movement of Head, 4½". Micrometer dials on Transverse and Vertical Feeds. Spindle Speeds:—100, 200, 600 and 1200 r. p. m.

W. H. NICHOLS & SONS

WALTHAM, MASS., U. S. A.

STANDARD *Multiple Grinders*

A MULTI-SPEED GRINDER FOR MULTIPLE ECONOMY—Peripheral speed is maintained, thus increasing production. Wheel stubs from larger wheels, formerly discarded, may be transferred to this Grinder.

Outstanding Advantages Include:

Safety type hinge door exhaust guards, adjustable to wheel wear. Interlocking arrangement prevents overspeeding of grinding wheels. Push button starting. Available in wheel sizes, 10" to 30" diameter. Suitable for Vitrified and Resinoid bond wheels.

This Multi-Speed Standard Grinder operates with the same efficiency at either 25 or 60 cycles through its belt drive.

Write for catalogue 43. Prices, detailed information.

The STANDARD ELECTRICAL TOOL Co.

CINCINNATI • OHIO

2490 RIVER ROAD

SMITH & MILLS

CRANK SHAPERS

sizes 12" to 32" stroke

THE SMITH & MILLS CO. Cincinnati, Ohio

Giant KEYSEATERS

For cutting internal keyways, slots or splines 1/16" to 4" wide and up to 60" long. Fast—Accurate—Flexible. Write for particulars and catalog on machine for your work.

MITTS & MERRILL
913 Tilden St.
Saginaw, Michigan

HAMILTON

SWISS TYPE

GEAR HOBBERS

. . . for accuracy and speed in hobbing PINIONS, GEARS and SECTORS.

TWO MODELS

No. 00 SPUR GEAR HOBBER for work up to 2" dia.

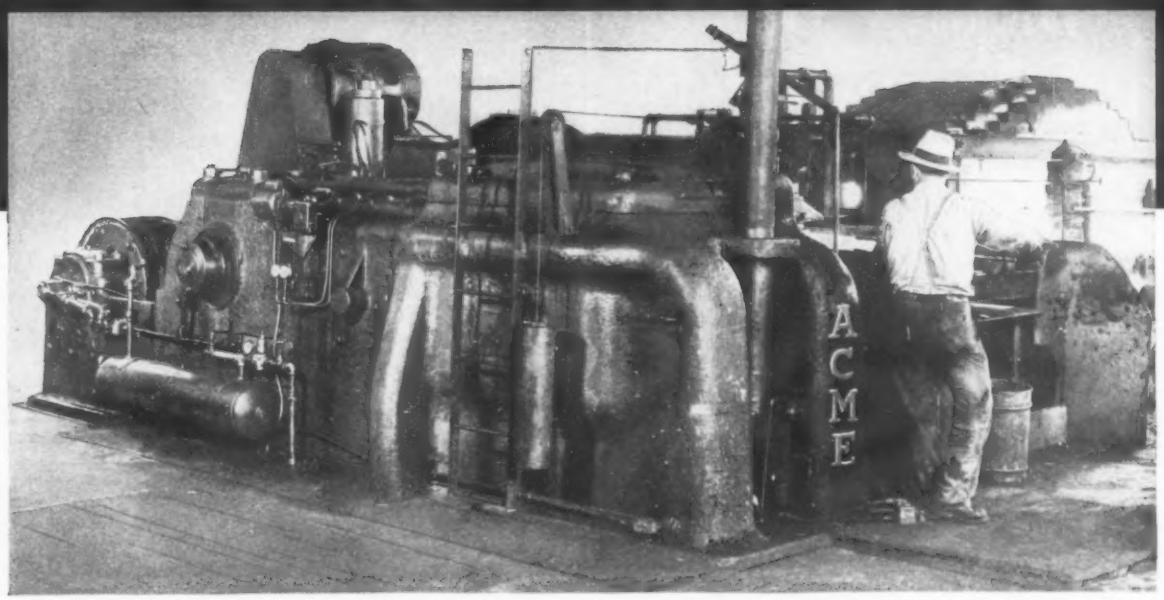
No. 1 SPUR and SPIRAL GEAR HOBBER (Illustrated) for work up to 6" dia.

Write for further details to

TRIPLEX MACHINE TOOL CORP.
Exclusive Sales Agents
125 Barclay St., New York, N. Y.

HAMILTON TOOL CO., *Builders*
Hamilton, O.

FORGING
24 HOURS A DAY
7 DAYS A WEEK



and the ACME 5" XN *can do it for years*

★ Whether it's forging shell today or gear blanks tomorrow—the ACME Model XN forging machine will give many years of uninterrupted cost reducing production. Users of this equipment all over the world are stepping up their output and the ACME XN's are standing the gaff. Permanent accuracy of tool alignment is assured by the extra long header slide. The owner of ACME XN forging machines can be assured of meeting and surpassing peace-time competition in the years ahead. Model XN forging machines are built in a complete range of sizes from 1" to 5" inclusive.

ACME MACHINERY DIVISION
of THE HILL ACME COMPANY
Established 1882
FORGING • THREADING • TAPPING • BOLT • NUT • RIVET MACHINES
4535 ST. CLAIR AVENUE
Cleveland, Ohio

A FEW IMPORTANT SUGGESTIONS ON THE DESIGN OF THREADED PARTS

FREE on Request

This brief Bulletin deals with the subject "Threading Close to a Shoulder" and points out what to avoid and the effects on costs and the conservation of critical metals.

H&G DIE HEADS

The Eastern Machine Screw Corporation

20-40 Barclay Street, New Haven, Conn.

Accurate, High-Speed

MOREY VERTICAL SHAPERS

8" STROKE
12" STROKE
14" STROKE

SELF-CONTAINED MOTOR DRIVE

Precision . . . Easily handled — your operators will appreciate it . . . **Cutting Stroke** changed quickly . . . **Feeds** varied instantly . . . **Power** rapid traverse in all directions . . . **Brake** for ram automatically applied . . . **Bijur Lubrication** . . . **Timken Bearings**—Bull gear mounted on Timken Bearings. Roller table mounted on Timken Bearings . . . **Modern Design**—built to the highest standards of workmanship and materials—simplified operation, powerful yet finger-tip control

DESIGNED AND BUILT BY

Ask for Circular No. 726

MOREY MACHINERY CO., INC.
410 Broome Street New York, N. Y.

Investigate

THE POSSIBILITIES OF THE NATIONAL KEYSEATING MILLER *on Your Work*

• Shops all over the country are solving difficult keyseating problems by chucking this attachment on their drill presses, radials and horizontal boring mills—and milling keyseats in pieces too large or bulky for convenient handling on keyseating machines.

The "National" goes through the hole once and mills keyseats with parallel sides and parallel with the axis of the bore. It's a big time and money saver and is available in standard stock diameters from ½" to 3½" for cutting lengths from 1⅞" to 12". It will keyseat in blind holes, taper holes, and offset holes. We also manufacture oil-grooving millers.

Several widths of cutters can be used with each size miller and many different hole diameters keyseated with one tool through the use of eccentric bushings.

WRITE today for Catalog No. 15

NATIONAL MACHINE TOOL CO.
CINCINNATI, OHIO

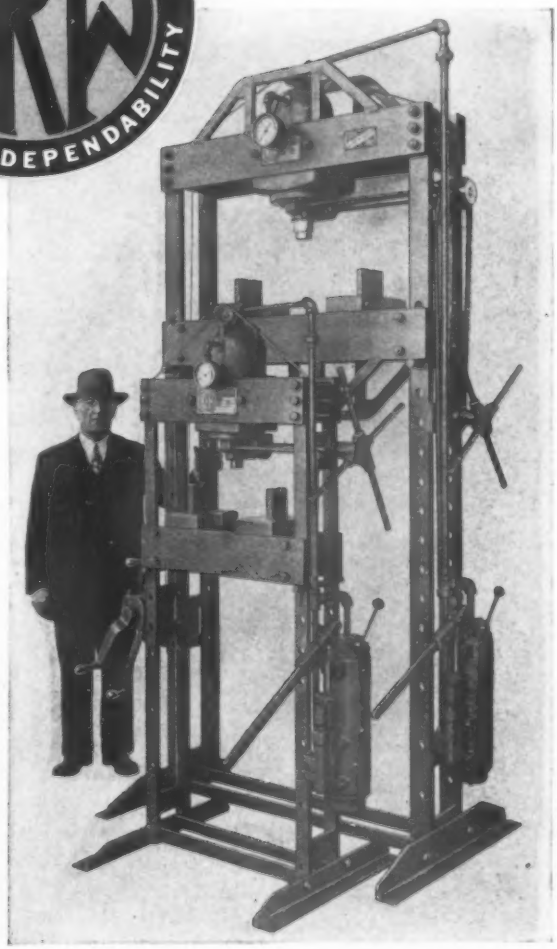
KRW HYDRAULIC ARBOR PRESSES

Engineered for War Production

★ ★

SINCE 1916 KRW A MARK OF DEPENDABILITY

Illustration below shows a special extra high 75-ton KRW Hydraulic Arbor Press in comparison with the standard 25-ton unit.



With standard KRW Hydraulic Arbor Presses as a work-proven basis, we have been able to speedily design and build many special presses for war production—without time-consuming engineering delays. The net result has been a greatly accelerated production of vital equipment which is helping to speed the day of Victory.

As an example: the large illustration shows a special, 4-man operated, air-oil press which is used extensively for bomb loading. Hundreds of these units are now in operation.

KRW also builds standard Hydraulic Arbor Presses in 25, 50 and 75-ton capacities in addition to bench-type Arbor Presses in 1/2, 1 and 3 ton capacities. If you have a problem that an arbor press might solve, talk to us. The facts concerning many successfully-solved production applications are available in our files.

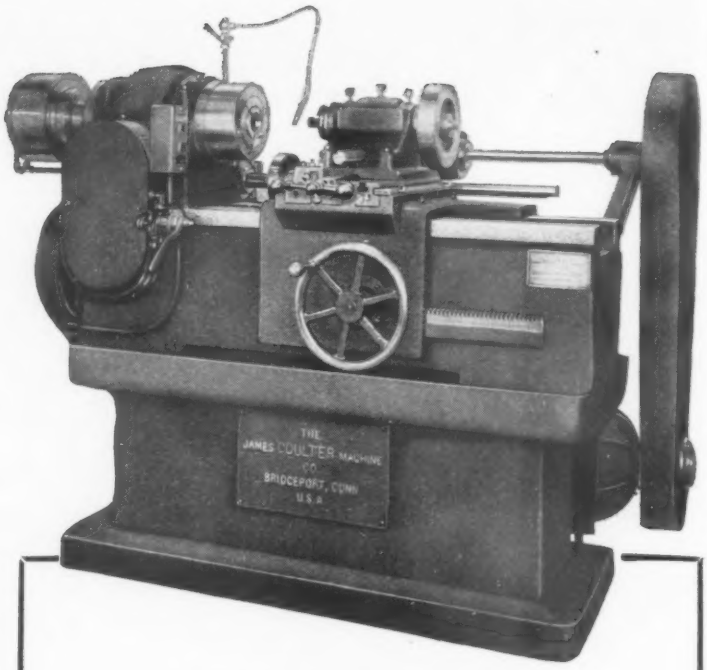
K. R. WILSON
10 LOCK ST., BUFFALO, N. Y.

Keep Ahead of
DEFENSE DEMANDS
on the PRODUCTION of
EXTERNAL and INTERNAL THREADS

The Coulter Type "H" Hob Thread Miller—modern in every detail of design and construction—handles high speed, accurate production of right or left hand threads. Any parts that can be held in ordinary chucks, air operated chucks, air operated collet chuck or special face plate fixture can be threaded on this machine.

Work holding spindle and cutter spindle are driven by individual motors through worm and gears. Speed changes to work spindle are accomplished by pick-off gears; cutter spindle speeds are controlled by variable motor sheave. All high speed shafts turn in anti-friction bearings.

Maximum external thread, 7"; minimum hole depends on smallest hob practical.



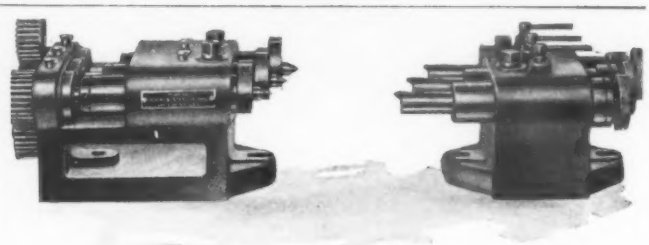
Send for Descriptive Bulletin giving full information.

The James COULTER *Machine Co.*
BRIDGEPORT • CONNECTICUT • U.S.A.

Douglas 32" X 8" PLAIN MILLER
FOR SMALL PARTS PRODUCTION

EARLY DELIVERY
BY LARGE SCALE PRODUCTION

DOUGLAS MACHINERY CO. INC.
150 BROADWAY NEW YORK, N. Y.



THIRTY YEARS EXPERIENCE MANUFACTURING

MULTIPLE SPINDLE INDEX CENTERS

ADJUSTABLE ANGLE ILLUSTRATED

Three and four spindles of various types and sizes.

Write for circular.

JOHN B. STEVENS INC. • 474 Canal St., New York, N. Y.

Sensitive DRILLING MACHINES
Avey
CINCINNATI OHIO

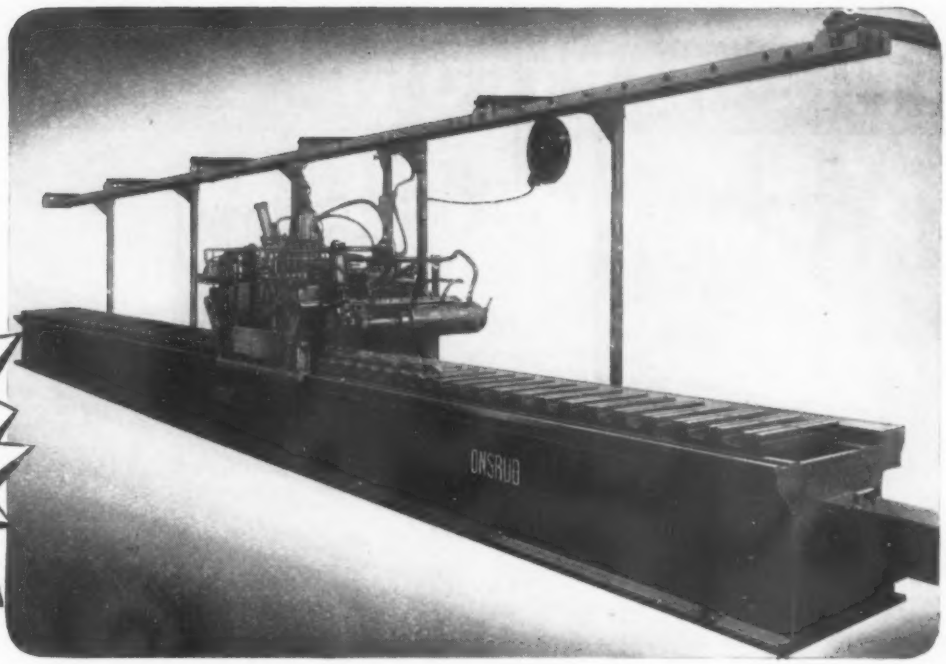
DAVIS KEYSEATER

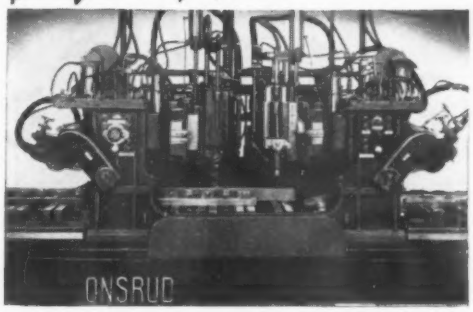
This low cost machine will handle any keyseating job in the shop up to 1¼ in.

Write for illustrated bulletin

DAVIS KEYSEATER CO., 403 Exchange St., Rochester, N. Y.

The Machine that *Blasts* Bottlenecks!





Complete carriage assembly showing cutter motors and front operating stations. G.E. Thy-mo-trol unit converts A.C. line to D.C. permitting use of D.C. carriage feed motor and stepless rheostat speed control.

A view of the Cam Bar for Automatic Feed Control to slow down or speed up carriage travel according to the cutting demands made by the work. Proper feed rate is automatically maintained.

The new Onsrud A80-A Automatic Contour Miller increases still more the type of high speed production machining originated by the Onsrud Spar Miller. This new machine brings to a high degree of perfection the new milling technique which is effecting such important savings in aircraft manufacturing man-power, time and machines.

Taking cuts in both vertical and horizontal planes in one operation, the A80-A greatly simplifies and speeds up production of long, intricate shapes from billets or extrusions. Features like the following are responsible for the machine's high production rate and capacity for unusual types of work.

Four Cutter Heads
Two vertical and two horizontal. Up to four cuts in one operation. One of the vertical heads tilts under automatic pneumatic control to make varying angle or twist cuts.

Variable Speed Carriage
The carriage rides on a precision machined bed to feed cutters to the work at any speed from 2″ to 18½′ per minute.

Sectional Bed Construction
Bed is made up of combinations of 7½ and 15 ft. sections to any length desired.

Open Grate Table
Built in 20 in. sections. "T" slots on 9 in. centers permit air or hydraulic clamps to be placed below table surface. Speedy loading and unloading results.

Extra Carriage Support
A removable front carriage support makes possible greater rigidity when work requires.

High Cutter RPM
Cutters are driven by individual motors with ample power to maintain cutting speeds for all types of cuts.

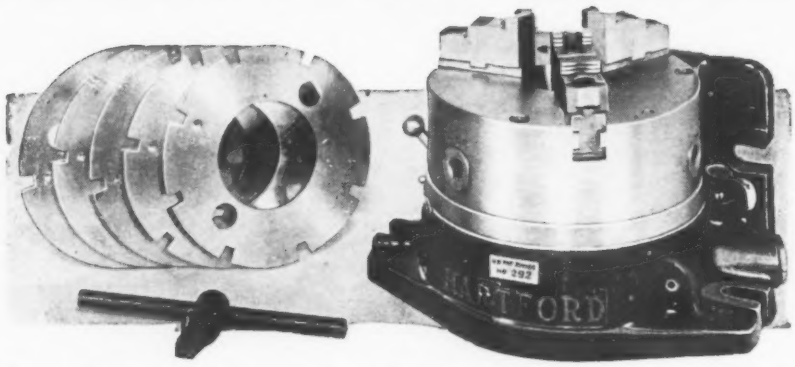
For a complete and detailed description of the A80-A send for bulletin. Draw on our long experience in the field of high speed cutting and machine tool design to help you solve your machining problems. Write today to the

ONSRUD MACHINE WORKS, INC.
3921 Palmer Street, Chicago, Illinois, U.S.A.
Sales Offices in all Principal Cities

Onsrud

MACHINE TOOLS AND METHODS FOR TOMORROW'S PRODUCTION

THE HARTFORD SUPER-SPACER



. . . provides a fool-proof means of indexing worth investigating today . . . . .

Regardless of the quantity of work handled—whether one piece or many — the HARTFORD SUPER-SPACER can be depended on to provide a fool proof method of indexing. It is applicable to milling, drilling, slotting and planing operations and can be used in either a vertical or horizontal position.

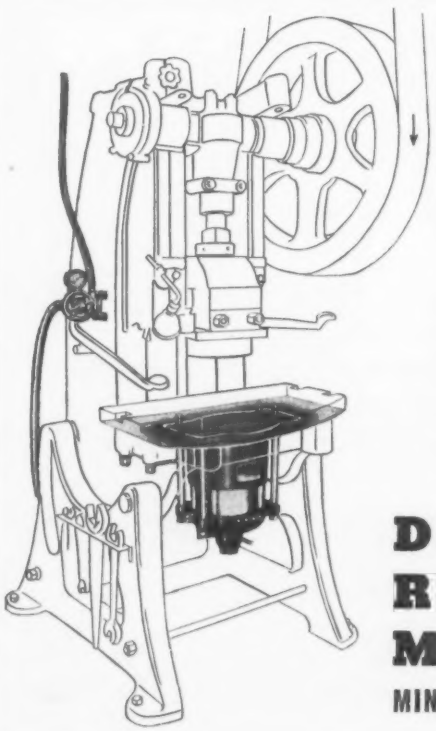
In scope of work it can handle and in the accuracy with which it operates, the HARTFORD SUPER-SPACER offers many opportunities to speed production of work where indexing is involved. Positive operation with all chance of error removed is assured by mask plates.

"HARTFORD" engineers will gladly cooperate with you in studying the possibilities offered by the SUPER-SPACER on your work. Ask for our assistance in helping you improve your production.

THE HARTFORD SPECIAL MACHINERY COMPANY

HARTFORD CONNECTICUT

MODERNIZE YOUR DIE CONSTRUCTION with the NEW IMPROVED DAYTON ROGERS Universal Pneumatic DIE CUSHION

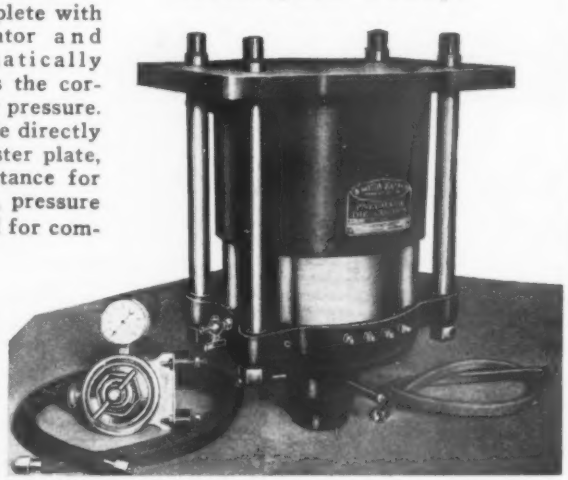


This accurate device — which provides adjustable working pressure in place of springs or rubbers—is applicable to compound, blanking, piercing and all deep drawing dies.

It is a self-contained portable unit which can be quickly installed on any punch press. Each unit is furnished complete with a combination regulator and gauge which automatically maintains and records the correct draw ring holding pressure. Mounting may be made directly to bottom side of bolster plate, spaced to desired distance for control of draw rings, pressure pads or it may be used for compound blanking, piercing and drawing. High pressure hose and necessary fittings are furnished for connection to shop air line.

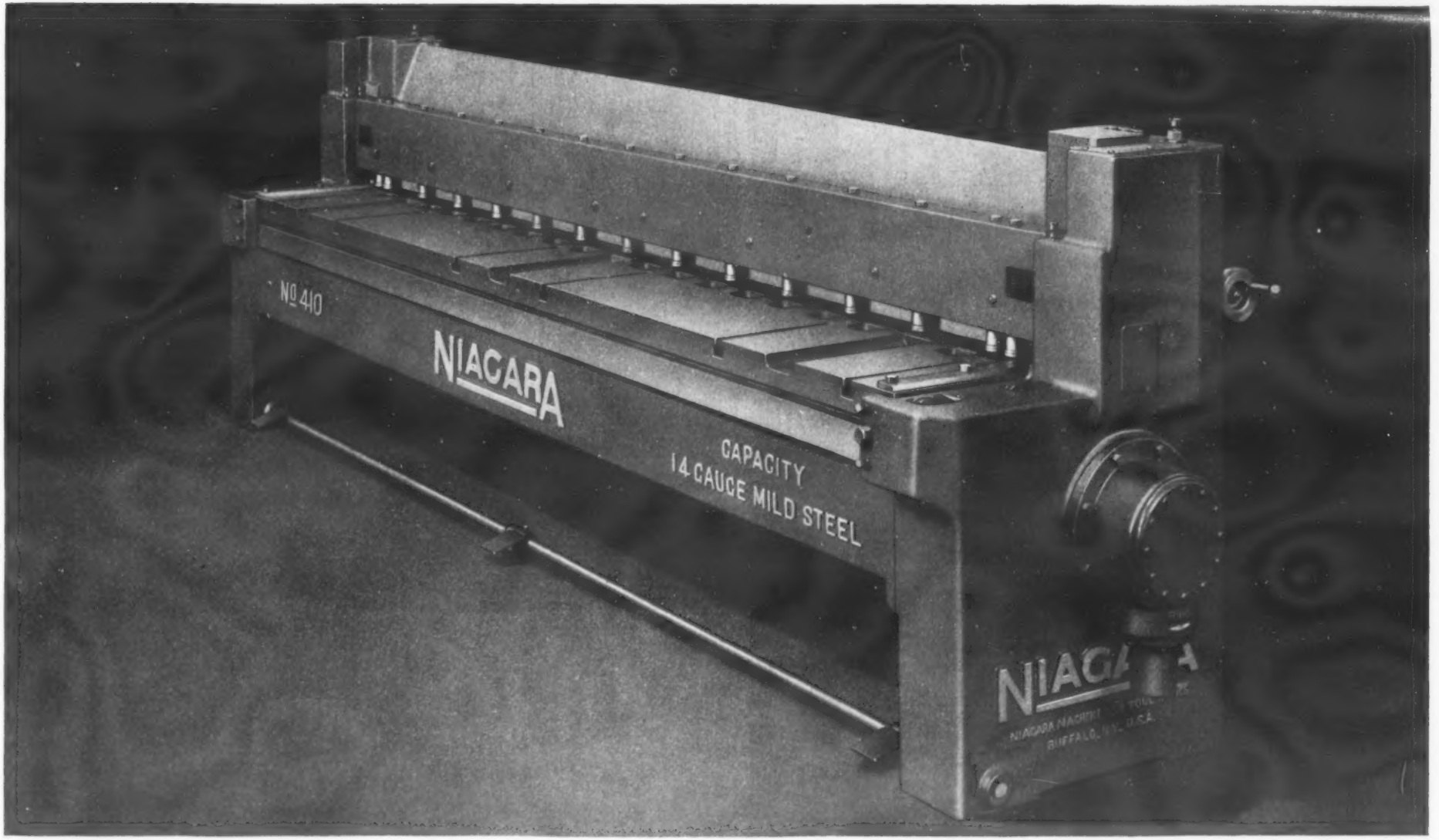
Made in 6 sizes, from 6" to 15" dia. die cushion pistons.

Investigate Today!



DAYTON ROGERS MFG. CO.

MINNEAPOLIS, MINN.



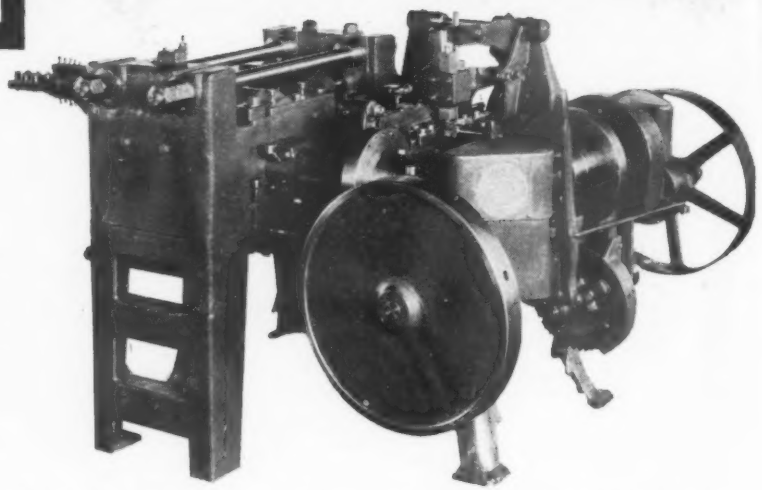
War plants are obtaining more production per man-hour with Niagara Power Squaring Shears because of accurate cutting, quick setting, ball bearing, self-measuring parallel back gages, full visibility of cutting line, instant acting Niagara sleeve clutch and other modern features.

Enclosed drive with gears, clutch and eccentrics running in oil assure long life and low maintenance cost. Four-edge, solid tool steel knives are standard equipment. Niagara Machine & Tool Works, Buffalo, N. Y. District Offices: Detroit, Cleveland, New York.

Having a spare set of knives for every shear eliminates lost time while knives are being reground. Prompt delivery on spare knives for Niagara Squaring Shears. Also factory regrinding service by the same skilled men who grind new Niagara knives.

The New NILSON AUTOMATIC PRESS and FOUR SLIDE MACHINES

for swaging, stamping, piercing, blanking, forming of coiled metal

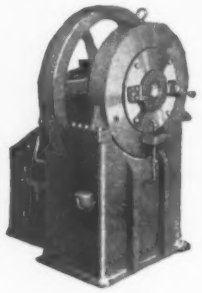


These new machines built in two models—for general purpose, heavy duty fabricating metal forming—provides a capacity far beyond what is practical to accomplish with ordinary cam motion. The new NILSON is a combination power press and four slide machine with powerful silent action of main press slide operated by crank motion through toggle or knuckle joints. Great strength and rigidity are inherent in this machine. Die sets are readily accessible and easily removable. No obstruction to view is offered and tools can be adjusted without interference.

These machines are built in 2 sizes—for forming from 3/16" and 1/4" diameter wire and for flat material 2" and 2½" wide. Send for 4-page bulletin giving complete details.

As specialists in the design and construction of special automatic machinery of all kinds, we are in position to render a complete service on this class of work. Consult Nilson on your special requirements.

THE A. H. NILSON MACHINE CO... Bridgeport, Conn., U.S.A.



THE TORRINGTON ROTARY SWAGING MACHINE

— with 4000 forceful squeezing hammer blows per minute—makes metal tougher and more elastic. Send for booklet—"The Torrington Swaging Machine."

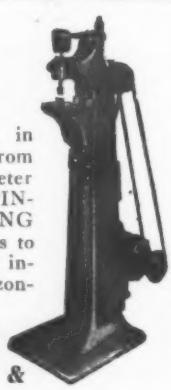
The Torrington Co., Swager Dept.
56 Field Street Torrington, Conn.

PRESSES
FEEDS
AUTOMATIC EQUIPMENT
THE V & O Press Co, INC.
HUDSON, N. Y.

BAUMBACH
STANDARDIZED DIE SETS

BETTER-MADE
DIE SETS
AT LOWER COST
46 Styles—195,000 Sizes
E. A. BAUMBACH MFG. CO.
Machined Steel Drop Forged Steel Semi-Steel
Send for our new catalog
1812 South Kilbourn Ave., Chicago, Ill.

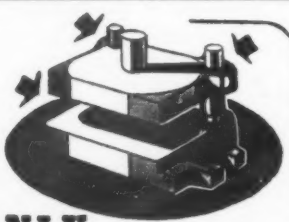
GRANT



RIVETERS—PIONEERS in their line—head rivets from smallest to 5/8" diameter either by NOISELESS SPINNING or VIBRATING HAMMER method—Sizes to meet all needs—Types include Vertical and Horizontal Multiple Spindles.

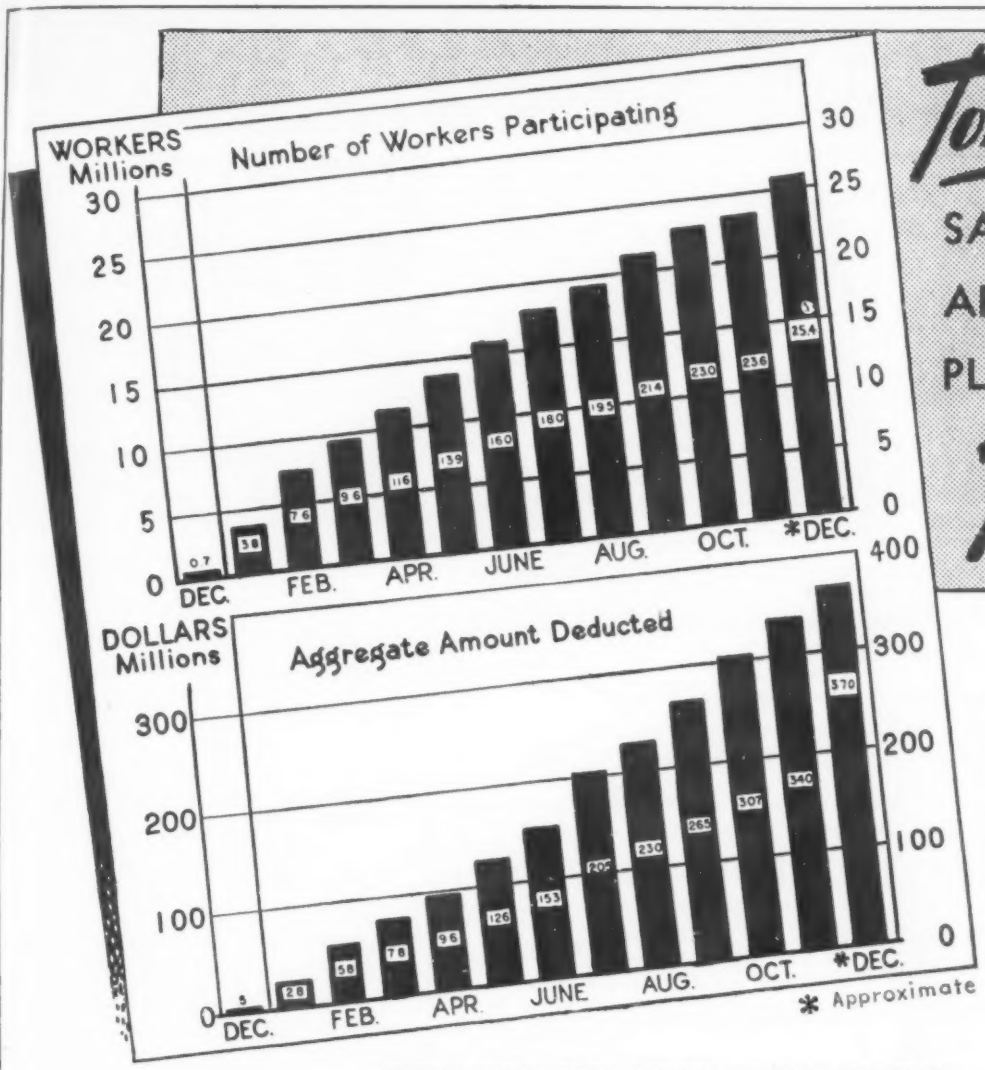
Write for literature and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
85 Stillman Ave., Bridgeport, Conn., U. S. A.



DANLY
PRECISION DIE SETS
DANLY MACHINE SPECIALTIES, INC.
2100 S. 52nd Avenue, Chicago, Ill.
MILWAUKEE • LONG ISLAND CITY, N. Y.
DAYTON • DETROIT • ROCHESTER
CLEVELAND • PHILADELPHIA
Ducommun Metals & Supply Co.
Los Angeles • San Francisco

THEIR PRECISION
Means Greater Accuracy In Your Production
Danly Commercial Sets
Danly Special Sets
DANLY
DIEMAKERS' SUPPLIES



Tomorrow's SALES CURVES ARE BEING PLOTTED . . . Today

THESE CHARTS SHOW ESTIMATED PARTICIPATION IN PAYROLL SAVINGS PLANS FOR WAR SAVINGS BONDS (*Members of Armed Forces Included Starting August 1942*)

STUDY THEM WITH AN EYE TO THE FUTURE!

There is more to these charts than meets the eye. Not seen, but clearly projected into the future, is the sales curve of tomorrow. Here is the thrilling story of over 25,000,000 American workers who are today voluntarily saving close to FOUR AND A HALF BILLION DOLLARS per year in War Bonds through the Payroll Savings Plan.

Think what this money will buy in the way of guns and tanks and planes for Victory today—*and mountains of brand new consumer goods tomorrow.* Remember, too, that War Bond money grows in value every year it is saved, until at maturity it returns $4 for every $3 invested!

Here indeed is a solid foundation for the peace-time business that will follow victory. At the same time, it is a real tribute to the voluntary American way of meeting emergencies that has seen us through every crisis in our history.

But there is still more to be done. As our armed forces continue to press the attack in all quarters of the globe, as war costs mount, so must the record of our savings keep pace.

Clearly, on charts like these, tomorrow's Victory —*and tomorrow's sales curves*—are being plotted today by 50,000,000 Americans who now hold WAR BONDS.

EVERYBODY EVERY PAYDAY AT LEAST 10%

Save with War Savings Bonds

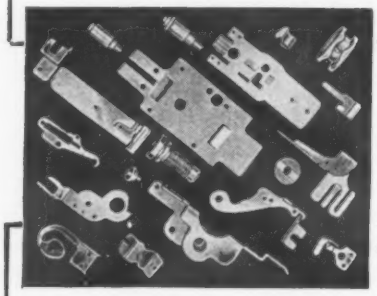
This space is a contribution to America's all-out war effort by

AMERICAN MACHINIST

CONTRACT WORK

STAMPINGS AND ASSEMBLIES

Fast Service on Long or Short Runs



"GREATER SAVINGS WITH GREIST"

We can handle your stamping and assembly requirements in any metal. Our modern equipment and methods coupled with 50 years of experience is your guarantee of accuracy and efficiency. Our facilities include capacity for handling screw machine products, tools, dies, jigs and fixtures.

Quality work by skilled mechanics is assured. Send your blueprints or samples today for prompt quotations!

THE GREIST MFG. CO.
546 BLAKE ST. NEW HAVEN, CONN.

METAL STAMPINGS

• TOOLS • DIES •

PERMANENT MAGNETS

HEAT TREATING

THOMAS & SKINNER

STEEL PRODUCTS CO.
1103 E 23rd St INDIANAPOLIS IND

SPECIAL ENGINEERING WORK

ON A CONTRACT BASIS . . .
exactly to your specifications . . .

A complete and efficient service for the manufacture of machines and parts, special tools and fixtures, etc., is available to you in our modern, fully-equipped shop. We also offer cam milling facilities that will fit your requirements. You are guaranteed quality work at a reasonable cost.

Send your blueprints or samples *today* for prompt quotations at no obligation.

Designers and builders of wire and ribbon stock forming machines.

THE A. H. NILSON MACHINE CO., Bridgeport, Conn.

COMMERCIAL HEAT TREATING

Seasoning of Steel, Nitriding
Centerless, Broach, Thread Grinding
Magnaflux & Optical Testing
Metallurgical & Chemical Laboratories
Cadmium & Hard Chrome Plating

AGERSTRAND CORPORATION
Muskegon, Michigan

Gray Iron and Semi Steel Castings, also alloyed with nickel, chrome, and molybdenum. Wood, Iron, Brass and Aluminum pattern work.

KING FOUNDRIES, INC.
Phone 823 North Wales, Montg. Co., Pa.
22 Miles from Philadelphia, Pennsylvania

KIRK & BLUM

CONTRACT MANUFACTURING
ACCURATE SHEET STEEL
STAINLESS STEEL, MONEL OR
OTHER ALLOY FABRICATION
OUR SPECIALTY
CAPACITY 3/8" AND LIGHTER

THE KIRK & BLUM MFG. CO.
2823 SPRING GROVE AVE. CINCINNATI, OHIO

QUALITY

SCREW MACHINE
PRODUCTS

• ● •

WALTHAM
SCREW COMPANY
WALTHAM • MASS.

WIRE AND METAL SPECIALTIES

In round, flat, square and special shaped wire in all metals.

LARGE PRODUCTION CAPACITY

Plating and finishing.

EASTERN TOOL & MFG. CO.
BLOOMFIELD, N. J.

PATTERNS in WOOD and METAL

For All Kinds of Castings, Large or Small
MATCH PLATE WORK A SPECIALTY

Put your pattern problems up to us—we will take care of them.

GENERAL PATTERN WORKS
2233 Buck Street Cincinnati, Ohio

DESIGN & BUILD
JIGS, FIXTURES & GAGES

REED MACHINE & TOOL ENG.
BOX 662
PAWTUCKET, R. I.

MACHINE SHOP

Facilities include 9" South Bend Bench Lathe, #2 Brown & Sharpe Milling Machine, Drill Press and 8"x8" Shaper. The usual line of hand tools and equipment plus experienced workmanship assure your satisfaction. Your inquiries invited.

C. VANDEGRIFT CO.
HOCKESSIN DELAWARE

MACHINE SHOP WANTS DEFENSE WORK

Lathes, Milling Machines, Drill Presses, Riveting, Hot Dip Tinning, Jigs and Fixtures. Investigate TODAY.

STEPHEN J. LEWIS ENGINEERING CO.
218 Butler St. Triangle 5-5348 Brooklyn, N. Y.

SUB-CONTRACT FACILITIES FOR

Hand screw machine products

Engine and bench lathe, milling and drill press work.

Small sheet metal fabrications to closer than commercial tolerances.

Stampings.

We do our own tooling.

RELIANCE MACHINE & MFG. CO.
Thirty Irving Place New York City
36 years experience in metal fabrication

PUT YOUR IDLE CAPACITY TO WORK!

Hundreds of metal-working companies are finding profitable business today *outside* their regular lines.

You, too, can put your idle machines and equipment to good use by directing attention to them through American Machinist's CONTRACT WORK SECTION.

American Machinist's net paid circulation of over 21,000 reaches the men who need and can authorize sub-contracting.

Tell your story to these men through American Machinist's CONTRACT WORK SECTION. We will gladly send you complete information at no obligation.

CONTRACT WORK DEPARTMENT
AMERICAN MACHINIST 330 W. 42d St., New York, N. Y.

SEARCHLIGHT SECTION

(Classified Advertising)

EMPLOYMENT : "OPPORTUNITIES" : EQUIPMENT
BUSINESS : : USED OR RESALE

UNDISPLAYED —RATES— DISPLAYED

10 CENTS A WORD. MINIMUM CHARGE $2.00
Positions Wanted (full or part time salaried employment only), ½ the above rates payable in advance.
Box Numbers—Care of publication New York, Chicago or San Francisco offices count as 10 words.
Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Individual Spaces with border rules for prominent display of advertisements.
The advertising rate is $6.50 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.
An advertising inch is measured ⅞" vertically on one column, 3 columns—30 inches—to a page.

(Copy for new advertisements received by February 19th will appear in March 4th issue subject to sapce limitations)

WANTED
CHIEF ENGINEER

American born citizen age 35 to 60, experienced on light plants and small single cylinder diesel engines 5 to 25 h.p., whose objective is not to make the unit run but to design it so as to be competitive and easily made. Permanent position with salary and bonus if capable. Give previous positions held with dates and salaries. All correspondence strictly confidential. 100% War Work.

P-520, American Machinist
520 No. Michigan Ave., Chicago, Ill.

WANTED

Experienced Foreman for a Tool, Cutter and Gage Shop.

P-510, American Machinist
330 West 42nd St., New York, N. Y.

GENERAL MANAGER WANTED

Old established Ohio plant employing 300 to 400—designing and manufacturing jigs, fixtures, dies, special machinery and production machining, ordnance and aircraft parts, desires a man knowing tooling, processing, estimating and general machine shop practices.

Permanent position. Excellent opportunity for competent producer. Salary open. State age and complete experience in first letter.

P-522, American Machinist
520 N. Michigan Ave., Chicago, Ill.

SUPERINTENDENT
FOR SCREW MACHINE DEPARTMENT

Chicago manufacturer is looking for a high grade, efficient superintendent who has a thorough knowledge of Brown & Sharpe automatic screw machines as well as secondary operation machines.

Our work is primarily non-ferroused metal. The man we require must be able to make his own lay-outs, estimate costs, set and operate Brown & Sharpe machines.

This position will pay from $7,000.00 a year up. It is a permanent position and not a war baby.

When replying state full qualifications, references, etc.

P-528, American Machinist
520 No. Michigan Ave., Chicago, Ill.

WANTED
DRAFTSMAN

Competent draftsman experienced on internal combustion engines. Give full details of past experience, salaries drawn, and age, in first letter. Permanent.

P-521, American Machinist
520 No. Michigan Ave., Chicago, Ill.

Chief Mechanical Engineer

MANUFACTURER heavy machinery, established twenty years, Dun & Bradstreet rating AAA1, engineering department of one hundred employees, doing large successful business, now exclusively on war work, has permanent opening for Chief Engineer with following qualifications:

1. Proven genius for surveying requirements of a given field, with creative mind to initiate fundamental designs and supervise work through engineering department.

2. Applicant must be American citizen, graduate mechanical engineer, age 38 to 45, and of good personality with ability to cultivate confidence. Preferably with shop experience and employed as Chief Engineer, or in responsible capacity, with first class concern in heavy equipment industry.

3. All replies will be treated in absolute confidence, and neither employer or references communicated with until have your written permission. Equal opportunity comes to few men in life time. Compensation good. Later, if worthy, can acquire interest in closely owned business, known world over, as leaders in their field and who have enjoyed signal success.

4. To have consideration, give complete abstract of business experience, age, education, present compensation, salary expected to start, number of dependents and send snapshot not to be returned.

Address **P-523** American Machinist
330 West 42 St., New York City

EXPERIENCED TAP MAN

An exceptional opportunity is offered a man thoroughly grounded in the manufacture and servicing of taps. Applicant hired will take over production for a well established company in the middlewest. Must be familiar with thread problems. Good salary, excellent possibilities for advancement and company has a bright post war future. Reply in full detail including photograph, past experience present salary. Only those eligible under the WMC plan need apply.

P-525, American Machinist
520 No. Michigan Ave., Chicago, Ill.

POSITIONS VACANT

These Positions Vacant advertisements are published subject to agreement by the advertisers not to consider applicants now employed on war work unless they obtain written release from present employer.

MECHANICAL ENGINEER with extensive gear manufacturing experience for war plant. Wonderful opportunity for well qualified man. Write stating age, draft status, educational background, names and addresses of former employers. P-506, American Machinist, 330 W. 42nd St., New York, N. Y.

WANTED: First class engineer experienced in Machine Tool Design; practical experience desired. For man who can assume responsibility this is a good opportunity now and after war. P-512, American Machinist, 330 W. 42nd St., New York City.

WANTED: First class practical machine tool designer. This is good opportunity now and after war for man who can assume responsibility. P-526, American Machinist, 330 W. 42nd St., New York, N. Y.

SCREW MACHINE Set-up supervisor. Position of responsibility and future available for man who can set up and train operators to run six spindle Gridley and B&S Automatic Screw Machines. Communicate at once, giving all qualifications. P-527, American Machinist, 330 W. 42nd St., New York, N. Y.

EMPLOYMENT SERVICE

SALARIED POSITIONS — $2,500 to $25,000. This advertising service of 33 years recognized standing negotiates for positions of calibre indicated. Procedure individualized to your personal requirements. Retaining fee protected by refund provision. Identity covered. If salary has been $2,500 or more send for details. R. W. Bixby, Inc., 266 Delward Bldg., Buffalo, N. Y.

POSITIONS WANTED

MANUFACTURING EXECUTIVE—Technically trained mechanical engineer and industrial manager, 23 years experience in manufacturing heavy machinery, precision machine tools, and high quality diesel specialties—8 years in engineering capacities, 12 years in executive capacities. Successful records for organizing and coordinating engineering manufacturing and accounting functions. Accustomed to complete responsibility. 42 years old. PW-507, American Machinist, 330 W. 42nd St., New York, N. Y.

COMPETENT AMERICAN engineer with broad experience in product design and production engineering for low costs and high production Age. 57. Salary $8,000. Good teacher. Can organize, supervise, and train others. PW-529, American Machinist, 330 W. 42nd St., New York, N. Y.

PATENT ATTORNEYS

PATENTS, COPYRIGHTS. Booklet, "General Information Concerning Inventions and Patents" and "Fee Schedule" sent without obligation. Established 1915. Lancaster, Allwine & Rommel, Suite 453, 815-15th St., N.W., Washington, D. C.

CONTRACT WORK

WORK WANTED — For advertisements of work wanted see names indexed under Contract Work in the Searchlight Section Index appearing on page Facing inside back cover.

MISCELLANEOUS

WANT A BETTER JOB? On an average Sunday, there are 5,000 jobs of all classifications advertised in the Help Wanted Columns of the New York Herald Tribune. For industrial jobs in defense and other industries—follow the help columns of the Herald Tribune daily and Sunday. M-501, American Machinist, 330 W. 42nd St., New York, N. Y.

PROFESSIONAL SERVICES

COLUMBIA ENGINEERING CORP.
STRUCTURAL, MECHANICAL & ELECTRICAL ENGINEERS
War Plant Design - Supervision of Construction - Engineering Reports
61 Broadway, New York, N. Y
323 Plum Street, Cincinnati, Ohio

Selling, Business Opportunity and Wanted Advertising—page 308

Machinery Distributor and Salesman

Is this the opportunity you have been looking for?

If you are not subject to draft, and are over 30 years of age, with sufficient past experience in selling machinery to the metal working industry, we have a proposition that should interest you and make you a nice income.

Ours is a well established and fast growing machinery manufacturing business with representation in most of the principal American centers; at this time we are interested in adding to our sales organization several more distributors and a number of thoroughly experienced salesmen. Our machine sells to plants working on war materials. The price is upwards of $5000.00. We have complete research and engineering laboratories in which are being developed new type and essential equipment to meet post-war demands.

Write us giving a detailed outline of your past experience, both sales and practical, give names and types of machines you have sold, territory you have spent most of your recent years in, degree of past success, your age, married or single, condition of your health; all information will be treated strictly confidential and if your letter has convinced us that you are the man we are looking for, we shall contact you promptly.

SW-519, American Machinist
520 N. Michigan Ave., Chicago, Ill.

NOTICE

POST WAR WORK

Midwest company with modern plant, heavy cranes, railroad sidings, capital wants new ideas for manufacture or use of plant; practical for any development. Connection with company possible or other arrangements. Also interested in representing manufacturers, using plant for warehouse purposes and servicing.

BO-524, American Machinist
520 N. Michigan Ave., Chicago, Ill.

NEW INVENTIONS WANTED

Mechanical and electrical devices which can be used to promote our war production program. Either new ideas, or improvements upon present methods.

P. O. Box 217, Denville, N. J.

HIGH PRICES

Send us your list of machine tools, electric motors or other idle equipment for prompt action.

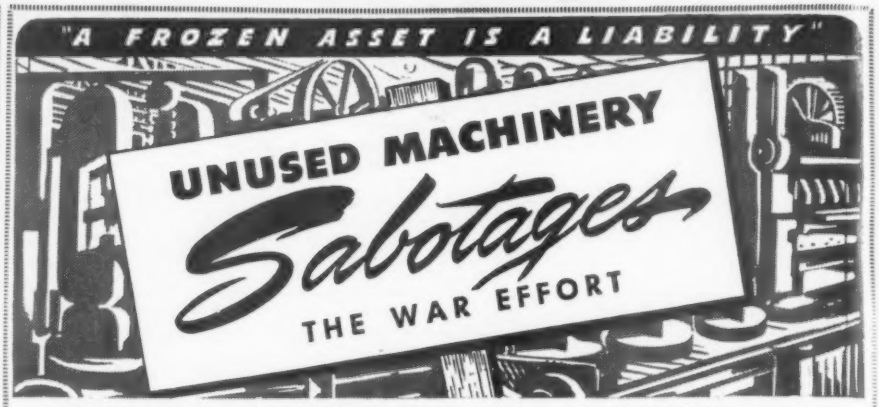
GEORGE GALES
1133 Broadway New York City, N. Y.
Tel—CHelsea 3-3600

IF YOU ARE DOING DEFENSE WORK

Send for Our Latest Circular Covering Bargains in Small Tools Such as Drills, Reamers, Turret Attachments, etc.

DeWITT TOOL COMPANY
173 Grand St. New York City

"A FROZEN ASSET IS A LIABILITY"



If changes in your production program have resulted in idleness or partial retirement for certain of your machinery—SELL these machine tools to other plants engaged in war work, where they can "do a job" in the front lines of production for Victory.

Aside from patriotic motives, sound business judgment dictates that this equipment be turned into cash in the present favorable market. The 1942 Tax Act is favorable to this program:

Capital gains are subject to very limited tax; capital losses (for the first time) may be fully charged against operating profits.

At your disposal now are our 25 years experience in marketing surplus machinery, industrial plants and complete operating units. We invite a confidential discussion of your position.

ASSET REALIZATION CO.

Under Personal Direction of **HERBERT I. SEGAL**

21 EAST 40TH ST. NEW YORK, N. Y.

ST. LOUIS' Headquarters FOR GOOD USED TOOLS, OFFERS:

ROCKFORD 24" S.P.D. Shaper
COLBURN 42" Vert. Boring Mill
MUELLER 4½' Gear Box Drive Radial Drill
PUTNAM 27"x14' Q.C.G. Lathe
PRENTICE 24"x12' M.D. Grd. H.D. Lathe
GISHOLT 30" Vert. Turret Lathe
OHIO #20 Plain Miller
NILES 12" Vert. Slotter
INGERSOLL 2—SP. Vert. Miller
B&S 48"x10", #4 Gear Cutter
DIAMOND M. D. Horiz. Surf. Grinder
GOULD & EBERHARDT Rotary Milling Mach.
BIGNALL-KEELER 12" M.D. Pipe Machine.

Write Us For Any Other Tools You May Want
Let Us Quote On All Machinery Needs

McDONALD MACHINERY CO.
1531-35 N. Broadway St. Louis, Mo.

AUTO. SCREW MACHINES

1⅜", 1¾", 2¼" Gridley 4 spindle

1", 2¼" Nat.-Acme 4 spindle

3¼", 4¼" Gridley sgle. spindle

CANAL MACHINERY COMPANY
176 LAFAYETTE STREET, NEW YORK, N.Y.

12" x 96" LANDIS Plain Cylindrical Grinder. Automatic Feed Machine.

28" x 24" x 24" stroke CINCINNATI SHAPER COMPANY Crank Planer. One head on rail, arr. for double tool blocks.

ALSO MANY OTHER TOOLS

ALEX ZEEVE & COMPANY
2269 Woolworth Building New York, N. Y.

FOR SALE

One Waterbury-Farrel, 750 Ton Lead Extruding Press and Pump, Model 4422-229-H.

FIELDSBORO MACHINE WORKS
Fieldsboro, N. J.

Announcing Our New Location

6—**Gleason Gear Cutters,** 11" and 18" machines
52x20' **New Haven Lathe**
48" **Boring Mill**
12—25 KVA **Spot Welders**
48x8 **Planer**
500# **Board Drop Hammer**
1000# **Steam Hammer**
Cleveland Automatics—⅞", 2¼", 2¾", single spindle
Arter Grinder, 6x20, cylindrical

Paul's Motor & Machinery Supply Company
6111 Vermont St. Detroit, Michigan
Tyler 76300-02

IMMEDIATE DELIVERY

10 ft. Pond Vertical Boring Mill

HEAVY DUTY

With 2 swivel heads; diameter of table 96"; maximum distance table to rail 60"; belt drive.

★ IN VERY GOOD WORKING CONDITION ★

H. H. PELZ MACHINERY CO.
9 So. Clinton St., Chicago, Ill.

IMMEDIATE DELIVERY...

"FALK" for DEPENDABILITY in Rebuilt Machinery

These are important factors to consider

GRINDERS

14" **Pratt & Whitney** Vertical Surface Grinder.
No. 6 **Besley** Double Opposed Disc Grinder.
No. 2 & No. 3 **Brown & Sharpe** Cutter Grinder.
Taft-Pierce Automatic Pin Grinder.
Gardner No. 4 Disc Grinder Double End, 20" disc, 16" ring wheel, ball bearing belt drive.
Badger No. 2 Double End Disc Grinder 16" disc, ball bearing spindle, Universal table.

THREAD MILLERS

Hall Planetary No. 2—24" Swing.
Lees-Bradner No. 8—12"x54.
Pratt & Whitney 6x14.
1—**Pratt & Whitney** 6 x 14 Thread Miller.

THREADING MACHINES

¾" **Acme** Double Head Bolt Threader, Belt Drive.
1¼" **Acme** Single Head Bolt Threader, like new.
Acme ⅝" Double Head.
Acme 3" Single Head.
Landis 1½" Single Head Bolt Threading Machine.

THREAD ROLLERS

2—#2 **Waterbury & Farrell** thread rollers.
1—#30 **Waterbury & Farrell** thread rollers.
2—#22 **Waterbury & Farrell** cold headless & double.

MILLING MACHINES

No. 1 **Cincinnati** Horizontal Plain Miller, Cone Dr.
No. 1B **Brown & Sharpe** Plain Miller, Single Pulley Drive.
No. 1 **Brown & Sharpe** Univ. Plain Milling Mach.
No. 1½ **American** Universal Milling Machine.
1—No. 2 **Owens** Plain Horizontal Milling Machine, knee type.

SHAPERS & SLOTTERS

24" **Cincinnati** Triple Geared Shaper, Fric. Dr.
7" **Rhodes** Shaper-Slotter.
15" **Hendey** Friction Drive (1) $450.00.
20" **Steptoe** Back Geared Crank Shaper Cone Drive.
20"x20"x24" **N-B-P** SHAPER PLANER, arr. M.D.
16" **Cincinnati** Back Geared Crank Shaper.
12" **New Haven** Slotter; 32" Rotary Table.
6" **Niles-Bement** Slotter 18" Rotary Table, Cone Drive. Like New.

RADIAL DRILLS

2—**Niles, Bement-Pond,** flat column 5' arm.
Niles Bement-Pond, flat column 6' arm.

SHEARS

1—**Mesta** 156"x38" Cap. Plate Shear.
1—**United Foundry & Engineering Co.** 156"x5/16" Cap.
Niagara No. 2120, 10'x14' gauge cap. motor driven, with back gauges and hold down. Late model, steel cross head.
1¼" thru 1" **Long & Allstatter** Comb. Punch & Shear.
Pexto foot Shears, size 36"x16 gauge.
156" **Hyde Park,** ⅜ cap. 18" gap, M.D.
156"x¼" **Hyde Park** Gap Frame Plate Shear M.D.
No. 702—**BLISS** TRIMMING PRESSES (2) Flat.
No. 4—**Waterbury** open back, rigid bed, plain.
520 Ton Southwark Hydraulic with Laurie Pump.
SHERIDAN EMBOSSING PRESS, 24x36.

PUNCH PRESSES

1—#14 **Thomas** Spacing Machine.
1—**Bliss** 310S Automatic Gang Press.
No. 4 **Bliss,** double crank, geared forging press.
2—No. 4½ **Bliss,** double crank geared forging press.
2—No. 4½ S **Bliss,** three column, geared forging press with Taper rolls.
No. 5—**Bliss,** double crank, geared forging press.
48" **Wickes Bros.** double end punch and shear 1¼ thru 1¾ cap. motor drive.
No. 36C **Toledo;** Twin Geared, Double Geared, Tie Rod Double Crank, Single Acting Power Press, Bed Area 72"x51".
No. 94½J **Toledo** Double Crank, Double Geared Twin Drive, Motor Driven Straight Side, Tie Rod Power Press, Bed Area 120"x50".
Toledo 83½J 125 Ton Power Press, Bed Area 95x34, Single Acting, 6" stroke. Double Geared Tie Rods.

DRILL PRESSES—HIGH SPEED, BALL BEARING; SLIDING HEAD;

4-Spindle **Foot-Burt** High Speed Ball Bearing with power feed to each spindle; automatic quick return, tight and loose pulley drive; 8" overhang No. 2 Morse Taper; table working surf. 14"x48".
1-Spindle **Avey** No. 3, 12" Overhang, No. 3 M.T. with Power feed; Ball Bearing.
1-Spindle **Avey** No. 2, 8" Overhang, No. 2 M.T. with Power Feed; Ball Bearing.

★ ★ ★ SPECIAL CLEVELAND AUTOMATICS

2—3¾" Cleveland "Model A" Automatics Motor driven. Large lot of equipment, high serial numbers, excellent condition, inspection under power. Immediate delivery.

GEAR CUTTERS

No. 1 **ADAMS FARWELL** Gear Hobber; complete.
No. 2 **WHITON** SPUR GEAR CUTTER, Auto.
36" **Gould & Eberhart,** "Victoria Model" perfect.
No. 13 **Brown & Sharpe** Spur & Bevel.
3½' Radial Drill **American** Triple Purpose.

★ ★ ★ SPECIAL BENDING ROLL

12' x ⅝" Bending Roll—
Hellers & Jones #4—;
Drop End Housing, Pyramid type, Power to forming Roll, Balance Bar—Self contained Base. Dble. clutch Drive. Immediate delivery.

VERTICLE BORING MILL

1—90" Pond Verticle Boring and Turning mill, A.C. motor drive, 2 Swivel heads on cross rail. Motor Drive Power rapid traverse, table 78" x 7½" thick with four chuck jaws, all geared feeds and speeds. Guaranteed first class condition.

INTERNAL GRINDER

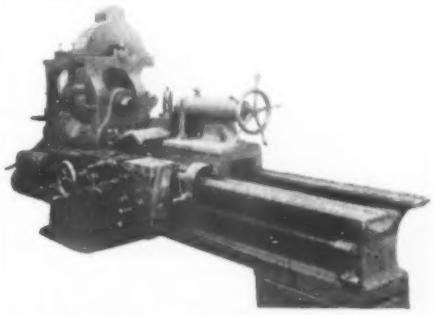
GREENFIELD No. 12, HYDRAULIC FEED, Motor Drive; Cap. swings 15"; Grinds automatically ¾" to 5" dia.; 4" Deep; New in 1928.

AUTOMATIC CHUCKING MACHINES

1—No. 24 New Britain type 4 spindle, 5 chucking stations.
1—No. 23 New Britain type 4 spindle, 5 chucking stations.
1—Jones & Lamson Hartness Automatic Chucking Lathe Motor Driven 12" diam., 6" face, 6" width cap.

LATHES

12"x6' **Reed-Prentice** Lathe, complete, cone driven.
20x10' **Mueller** Lathe Q.C.G. Taper Attachment, Chuck, Double Back Geared.
14x6 **Monarch** Arranged Motor Drive.
14x6 **Hendey** Yoke Head Arranged Motor Drive.
14x5 **Hendey** Yoke Head Cone Drive.
34"x12' **Putnam** Quick Change Gear Screw Cutting Engine Lathe, Arranged Motor Drive.



30"x12' **Putnam** Quick Change Gear Lathe.
McCabe Geared head lathe 40" swing 18' bed 18 speeds, direct motor drive 3/60/220.
18x10' **Rahn Larmon** plain change geared lathe.
10"x24" New **Logan** lathes, with collets, etc.

Every Item Guaranteed

FALK MACHINERY COMPANY

18 WARD ST.

SEARCHLIGHT SECTION

AUTOMATICS

14"x19" Fay
No. 6A Potter & Johnston
Nos. 33, 34 and 454 New Britain
4½" Gridley model H
6"x6¾" Goss & DeLeeuw
1" Cleveland "J" double end
No. 16 Gisholt simplimatics
10" Bullard "Vert-au-Matic"

BROACHES

Nos. 1, 3 and 4 LaPoint screw
No. 3 LaPoint double screw
No. 2 Standard screw press
2 ton American rack vertical

DRILLS

15", 20", 21" Buffalo
20", 22½" and 26" Barnes
21" and 25" Superior
20", No. 210 Barnes heavy
24" Barnes all geared
20" No. 23 Foote Burt
21" Cincinnati manufacturing
Natco multiple Nos. 11, 12, B12, C12, 14 and 32, 8 to 62 spindles
No. 1 Baush multiple
No. 13 Pratt & Whitney multiple
Nos. 15½D and 15½F Foote Burt manufacturing
No. 8H Natco hydraulic horizontal multiple
Barnes vert. mult. hydr.
8 spindle No. 6 Moline Holehog
Nos. 0 and 00 Garvin duplex
4"x10" Sundstrand centerer
4' Hammond radial
Sensitive drills. Almost all makes and sizes

FORGING & STRUCTURAL

1⅛" Acme upsetters
2⅛" and 4" Ajax upsetters
2" National upsetter
No. 1A Ajax forging rolls
No. 4 Torrington swager
No. 6HS Langelier swager
60 lb. Bradley helve hammer
150 lb. Nazel air hammer
No. 1 Rock River bulldozer
No. 29 Williams White bulldozer
12", 1½"x1" Cleveland horizontal punch
12", 1¼"x1" Long & Alstatter punch
26", ¾"x¾" Rock River punch

GEAR MACHINERY

Nos. 3 & 12 Barber Colman
No. 18 H Gould & Eberhardt
Nos. 1 & 5A Lees Bradner
26"x48" Brown & Sharpe automatic
30" Flather automatic
36" Gould & Eberhardt automatic
60" Cincinnati automatic
Nos. 6, 61 & 62 Fellows shapers
18" Gleason testers & lappers
15" Gleason spiral gear rougers
Gleason spiral pinion rougher
18" Gleason bevel generator
2 spindle Lipe chamferer
Pratt & Whitney worm grinder
National gear checker

GRINDERS

10x36 x 10x50 Norton
12x36 Landis
12x36 Cincinnati
Capitol internal
Nos. 6 & 15A Bryant internal
12"x36" Diamond surface
20"x50" Safety surface
Nos. 50 & 60 Heald cylinder
18", 24" & 53" Gardner disc
24", No. 84 Gardner opposed disc
17"x36"-48" Norton hydraulic crankshaft
Gisholt tool grinder
24" Ingersoll tub type
30" Ransom elect. snagging
16" Norton snagging
2¼" Wil. & Morman drill
Type 15 Norton lapper
No. 575 Hawes tub polisher
20" & 36 Wet Tool

LATHES, TURRET

28" Steinle, 8" hole
24" Steinle 6¼" hole
22" Steinle, 3-9/16" hole
22" Libby, 4½" hole
2¼x24 & 3"x36" Jones & Lamson
Double spindle Jones & Lamson
14"x6' Lodge & Shipley with turret
No. 2 Acme
No. 2 Southworth
No. 2 Warner & Swasey

LATHES, MFG.

11"x3' South Bend, OCG
13"x20" Seneca Falls "Short Cut"
13"x6' Automatic threading
20"x8'6" Wickes mfg.
Melling camshaft
Melling crankshaft
28"x9' centers Bridgeford axle
13½"36" Lo Swing

MILLS, BORING

3⅞" bar Beeman & Smith horiz.
4-15/16" bar Barrett cylinder boring
36" Niles vert. car wheel borer

MILLING MACHINES

No. 3 Turnmilling for round work
Nos. 1 & 1A Davis & Thompson drum type duplex
48" Oesterlein tilted offset
Nos. 10 & 45 Productomatic
No. 6 Whitney hand
12" Pratt & Whitney automatic
Model AB Becker vertical

PLANERS & SHAPERS

24"x24"x5' Gray
24"x24"x6' Woodward & Powell
29"x29"x6' New Haven
36" Morton draw cut shaper
12" Dill vert. shaper or slotter

PRESSES

No. 5 Bliss Consolidated OBI
No. 3½ Niagara OBI
Nos. P2 & PA3 Ferracute
Nos. 14½ & 41A Toledo horning
Nos. 6 & 6½ Wat. Ferrel gap
No. 76 Toledo gap frame
No. 62 Bliss gap frame
No. 38½ Bliss straight side
No. 53 Toledo straight side
No. 8-7 Zeh & Hahnemann S.S.
No. 7 Rockford straight side
No. 4 Massillion straight side
No. 2 Standard screw type
28", No. 71 Swaine dbl. cr.
No. 6A Bliss cam drawing
No. 180 Toledo toggle drawing
No. 796¼ Toledo double crank toggle drawing, 108" bet. upr.
750 ton Baldwin Southwark triple action hydraulic toggle, 142½" between uprights

RIVETERS

Nos. 3A, 4A, 5½B & 7B High Speed
No. 80 Grant
20 ton Allen pneumatic

SHEET METAL TOOLS

4'x3/16" Cincinnati press brake
12'x10 ga. Ohl press brake
4'x3/16" Bay City band roll
No. 352 Toledo band roll
Nos. 1 & 2M Pettingell hammers
⅜"x3' and 5' Shuster wire straightener & cutter
Sleeper & Hartley casing coiler
No. 5 Sleeper & Hartley spring coiler
No. 3 RH Magee Wirer

SHEARS

No. 0-15 Stanley Uni-Shear
No. 225 A Bliss slitter
18" Pels beam
2" Newbold guillotine
1[illegible]" Lewis alligator
2" Hilles & Jones alligator

TAPPERS

⅜" National precision nut
Nos. 1 & 2X Garvin
Natco lead screw, 1 & 2 way
1½" National 6 spindle nut

THREADERS

½"x3" Wat. Farrel thread roller
½" Acme double head
⅜" Economy
1½" Geometric
2" Landis double
2" Landis pipe & Nipple
2" Rogaco pipe mach.

MILES MACHINERY COMPANY, Saginaw, Mich.

GET GOING *NOW* WITH REBUILT MACHINERY

Partial Listing of Items In Stock Subject to Prior Sale

MACHINE TOOLS

BOLT CUTTERS—1½" Acme with Landis head, belt drive.

DRILLS—5' Bickford Radial, 13" column, mtr. drive.
4 spindle Leland-Gifford B.B. Sensitive, #2 taper, tapping attachment.
16" Henry & Wright, belt drive, Sensitive B.B., #2 M.T.

GRINDERS—#1 Gardner Face Grinder 7½ HP 3 phase motor hydraulic feeds, table 10"x30".
12"x36" Pratt & Whitney Surface Grinder, belt feeds.
#6 Bryant Internal Grinder, 12" swing, belt dr.
Springfield Planer Type, Surface, cap. 12"x50".
18" Gorton Disc Grinder, belt drive, two universal tables.

LATHES
36"x8' South Bend Brake Drum Turning Lathe, belt drive.
30"x10' Bradford, belt drive, plain change.
26"-48"x16' McCabe, double spindle, belt drive, 10' centers.
23"-46"x12' Putnam Extension bed Gap Lathe, quick change, belt drive.
20"x10' American, belt drive, quick change.
18"x14' Hamilton belt drive, quick change.
18"x12' LeBlond, belt drive, plain change gear.
16"-23"x8' South Bend Gap Lathe, belt drive.
12"x5' Hendey, motorized, quick change, taper attachment.

MILLERS—#2 Brainard Plain, belt drive, table 8"x30".
Hendey "Lincoln" type Production Miller, table 9"x30", belt drive.
#1 U. S. Hand, belt drive, table 5"x20".

PIPE MACHINES
½"—2" Landis, belt drive, lever operated chuck.
2½"—8" Williams, motor drive, quick opening diehead.

PUNCH
24" throat, Bement Single End, belt drive, cap. ⅝"x⅝".

PLANERS—24"x24"x6' Putnam, belt drive, 1 head.

SLOTTER—6" Newton, belt drive, 18" diameter table, power feeds.
10" Buckton, belt drive, 24" table, 23" throat power feeds.

TURRETS—#3A Warner & Swasey, geared head, universal, for chucking.

WHEEL PRESSES
200 ton Caldwell, 38" between bars, motor drive, with pump.

We are also representatives in the Philadelphia area for many of the leading national manufacturers of new machinery

Everything from a Pulley to a Power House

THE O'BRIEN MACHINERY CO.

PHILADELPHIA'S LARGEST MACHINERY DEALERS AND EXPORTERS

113 NORTH THIRD STREET • PHILADELPHIA - PENNA.

BELL TELEPHONE: MARKET 4180 CABLE ADDRESS: OBRIEN-PHILA

SIZES AVAILABLE

10x36
10x50
10x72
14x36
14x50
14x72
14x96
16x50
16x72
18x96
21x168

•

We can now Modernize and Motor a limited number of your NORTON Grinders.

MICRO-FINISH WITHIN PRECISION LIMITS WITH STANDARD GRAIN WHEELS

assured by

HILL-CLARKE *Modernized Motor Driven* CYLINDRICAL GRINDERS

Refinements incorporated by Hill-Clarke in these machines assure precision, minimum vibration and a finish which requires no extra grinding time. Even when using standard grain free-cutting wheels, these machines can be depended on for super-grinding and micro-finish.

Among the modern features offered in these machines to insure performance which meets today's exacting demands are the following Hill-Clarke developments.

. . . Multiple V-belt drive from constant speed motor to work head.

. . . an accurately fitted wheel slide having a ball bearing mounted feed screw—a refinement which assures sensitive wheel control and makes possible the duplication of work to extremely close limits.

. . . sheaves and motors dynamically balanced to insure smooth, vibrationless performance.

. . . mounting of coolant pump on a separate multiple compartment settling tank as a further means of eliminating vibration.

Other details of design and refinements are fully covered in illustrated bulletin "Super Grinding"—available promptly on request.

HILL-CLARKE MACHINERY CO. CHICAGO U.S.A.

HILL-CLARKE MACHINERY CO.

649 WASHINGTON BOULEVARD **CHICAGO, ILL.**

PHONE: HAYMARKET 7660 CABLE ADDRESS "REMAND"

KEEP 'EM RUNNING!

Every machine listed in this column is in our warehouse at press time.

●

#39 NATCO Straight Line Multiple Drill bored for 12 spindles, table 14" x 40"

#12 P&W Multiple Drill bored for 12 spindles, table 12" x 13"

#3 BEMENT Rail Drill, 2 spindles, No. 5 taper, table 15" x 64"

30" HENRY - WRIGHT Sensitive Radial Drill, Rotary base and Box table

24" G&E Spur Gear Cutter, M.D.

36" B&S Spur Gear Cutter, M.D.

60" B&S Spur Gear Cutter, M.D.

50" G&E Spur and Bevel Cutter, S.P.D.

90" P&W Spur and Worm Cutter

6" BILGRIM Bevel Gear Generator

15" GLEASON Bevel Gear Generator

No. 9 N.B.P. Vertical Miller 39" rotary table, 4" dia. spindle, M.D.

No. 10 N.B.P. Vertical Miller 42" rotary table, 5" dia. spindle, M.D.

30" x 48" x 10' NEWTON Slab Miller horizontal arbor, M.D.

48" x 48" x 20' PATCH Planer, 4 heads, 230 Volt D.C. Rev. Motor Drive

60" NEWTON Portable Slotter, 230 Volt D.C. Rev. Motor Drive.

SIMMONS ENGINEERED Machine Tool REBUILDING

SIMMONS MACHINE TOOL CORP.

1759 North Broadway, Albany, N. Y.

N. Y. Office: 149 Broadway

EASTERN OFFERS FROM STOCK

AUTOMATICS
4 spindle ⅞" Cleveland Model M
No. 6D Potter-Johnston, for Brake Drums
#22, 23, 33 New Britain Automatics

MULTIPLE SPINDLE DRILLS
3 spindle Rockford 12" Gang Drill
4 spindle Harrington Heavy Duty
5 spindle Detroit Horizontal
6 spindle National Acme Horizontal
8 spindle Hammond Horizontal
#96S Garvin Duplex Horizontal
#1 Baush Multiple
#1 Pratt-Whitney 2 spindle Gun Barrel Drilling Machine
#2 Baush Multiple
#2 Baush Multiple, hydraulic feed
#D2 Fox 7 spindle straight line
#3 Baush Multiple
#7D Moline 2 spindle Hole Hog
#D11 Fox Multiple
#11 Pratt-Whitney Multiple
#22AC Fox Multiple
#26C Fox Multiple
#51C Harrington Multiple

RADIAL DRILLS
3' Cincinnati Bickford Plain
2½' Avey Sensitive
3' American Sensitive
3' Carlton Sensitive
4' Hammond Jack Knife Sensitive
5' Prentice Plain, flat column

GEAR CUTTERS
16" Gould-Eberhardt Gear Cutter
#3—26" Cincinnati
30" Brainerd, spur & bevel
#3—26", #3—36", #3—Heavy, #4—48", #6—60", #6—72" Brown & Sharpe
#5 Lees-Bradner Gear Generator
Cross Gear Tooth Rounder
18" Gleason Straight Tooth Bevel Gear Generator
12" Ingle Gear Tooth Rounder

PLAIN CYLINDRICAL GRINDERS
10x36" Landis Integral Cam
10x36" Norton, M.D.
10x52" Landis, M.D.
10x72" Norton, M.D.
12x36" Cincinnati, belt
12x36" Modern, M.D.
12x42" Landis, belt
12x48" Modern, belted M.D.
16x120" Landis, M.D.
26x96" Landis, M.D.

HAMMERS
50 lb. Bradley Upright Strap
60 lb. Bradley Rubber Cushioned Helve
#400 Bliss Board Drop Hammer
600, 800, 1100, 2000, 2500 lbs. Niles Bement Pond Single Frame Steam Hammers

MILLING MACHINES
#1-B LeBlond Plain
#2 Cincinnati Universal
#5 Becker Vertical
Hendey-Lincoln type
Pratt-Whitney Lincoln type
Burr Mfg. Miller
4½x12", 6x14" Pratt-Whitney Thread Millers
36"x36"x14' Bement Slab, M.D.

PLANERS
24"x24"x5', 24"x24"x6', G. A. Gray, belt
24"x24"x6' Pond, belt
26"x26"x8' Niles, belt
30"x30"x10' American, belt
36"x36"x8' Ohio, belted M.D.
36"x36"x10' Niles, belt, 2 heads on rail
96"x72"x18' Pond, 2 heads on rail, 2 side heads.

PUNCHES & SHEARS
Cleveland type C, Single End, 18" throat
Cleveland Model EF, Double End, 36" throat
#2 Long-Allstatter, single end, 18" throat
#6 Long-Allstatter, single end, 9" throat
Robinson single end, 12" throat, 1" cap.

SLOTTERS
10" Newton, belt
12" Niles, M.D.
15" Niles, M.D.
84" Newton Screw type, M.D.
#1 National Acme Screw Slotter
#3 National Acme Screw Slotter

MISCELLANEOUS
Oil Extractor, 48", 14 cu. ft. capacity
Gisholt Precision Balancing Machine
Norton Running Balance Indicating Machine
Sprague (General Electric) 250 H.P. Dynamometer
17x21" Lentz Steam Engine & Allis-Chalmers Gen.
Anderson Filing Machine
#2 Cochran-Bly Filing Machine
#11 Cochran-Bly Saw Sharpener
#1 Leighton Straightening Machine (new)
4" & 6" Hurlburt-Rogers Cut-off machines
¼" and ⅜" Shuster Wire Straighteners

Also Lathes, Turret Lathes, Automatics, Boring Mills, Shapers, Upright Drills, etc., etc., in stock. Let us quote on your requirements.

The EASTERN MACHINERY CO.
1004 TENNESSEE AVE.
CINCINNATI, OHIO

. . IN STOCK

AUTOMATICS
¾" Gridley Model F, four spindle
1¼" Gridley Model F, four spindle
1¾" Gridley Model F, four spindle
No. 515 National Acme, four spindle
2⅛" Cleveland Model A, single spindle

DRLLS
2½' Fosdick Radial, c.d.
5' Fosdick Radial, m.d.
6' Prentice Radial, s.p.d.
No. 15½ Foote Burt Fixed Center
No. 12 Natco Multiple Spindle
No. 37 Natco Multiple Spindle
No. 1 Bausch, 8 spindle
Pratt & Whitney Gun Barrel, 2 spindle, m.d.

GEAR CUTTERS
No. 3 Brown & Sharpe Automatic
No. 6—72" Brown Sharpe Automatic
No. 6 Fellows Gear Shaper
96" Gleason Gear Planer
15" Gleason Spiral Bevel Generator
No. 5A Lees-Bradner Gear Generator
No. 10 Lees-Bradner Gear Grinder
30" Rochester Gear Tooth Rounder

GRINDERS
22" x 48" Pratt & Whitney Vertical Spindle Surface, Timken Bearing
30" Diamond Face, 84" Table Travel
10" x 20" Landis Cylindrical hydraulic
18 x 96 Landis Cylindrical
No. 60 Heald Cylinder

LATHES
No. 4 Elgin Precision Bench, c.d.
14" x 8' Walcott, c.d.
18" x 8' Lodge & Shipley, c.d.
24" x 8' Walcott, c.d.

TURRET LATHES
2A Warner & Swasey g.h.
2B Foster, g.h.
2½" x 26" Pratt & Whitney, g.h.
No. 6A Potter & Johnson, g.h.

MILLS
No. 1 Kempsmith Universal, c.d.
No. 1404 K&T Duplex Milwaukee Mill, m.d.
No. 31 DeVlieg Super Mill, m.d.
No. 33 Kempsmith, c.d.
Type A Gooley & Edlund
Hendey, Lincoln Type
2½" Cleveland Horizontal Boring, s.p.d.
4" Bement-Niles Horizontal Boring
4½" x 12" Pratt & Whitney Thread Mill
6" x 48" Pratt & Whitney Thread Mill

PLANERS AND SHAPERS
38" x 38" x 12' Niles Double End Planer, 4 heads
16" Gould & Eberhardt Shaper, c.d.

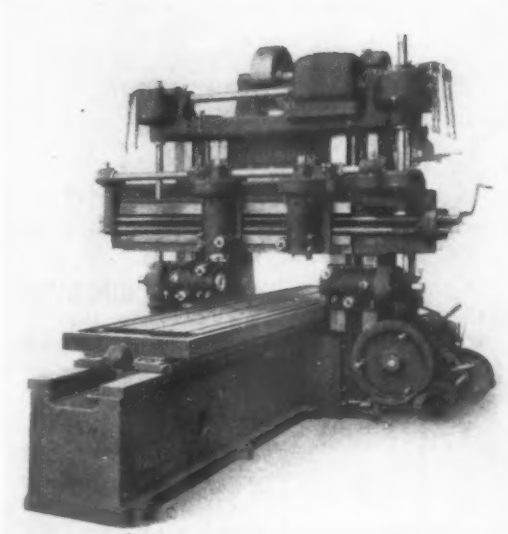
SAWS
6" x 6" Peerless Universal Shaping, m.d.
9" x 9" Peerless Universal Shaping, m.d.
No. 12 Higley Cold Cut, 16" blade

Restore your worn machines to their original accuracy by having us rebuild them!

We have a complete rebuilding department operated by men thoroughly trained in rebuilding. Your machines are taken down, carefully checked for wear, all worn parts are replaced, bearings and ways scraped and refitted. You'll find when rebuilt by us they'll perform like they did when they were new. *Write, wire or phone us.*

INDIANAPOLIS MACHINERY & SUPPLY CO., INC.
1959-69 South Meridian Street
INDIANAPOLIS, INDIANA
Eastern Branch:
44 WHITEHALL STREET, NEW YORK, N. Y.

MOREY OFFERS 2 INGERSOLL ADJUSTABLE RAIL MILLING MACHINES REBUILT



INGERSOLL 26"x26"x12' Planer Type Miller
Power Rapid traverse
Adjustable rail
2 heads on cross rail, 2 side heads
Distance between housings....26"
Max. height under rail....26"
Length of table inside of pockets....12'
Width of table....24"
Arranged for constant speed motor drive
Net weight about....33,350 lbs.

INGERSOLL 42"x42"x8' Planer Type Miller
Power rapid traverse
Adjustable rail
2 heads on cross rail
Distance between housings....42"
Max. height under rail....42"
Length of table inside of pockets....8'
Width of table....36"
Arranged for constant speed motor drive
Net weight about....28,750 lbs.

ASK FOR DETAILS

MOREY MACHINERY CO., INC
410 BROOME ST., NEW YORK

USED and REBUILT MACHINERY FOR SALE

LATHES
Porter Cable, M.D.
Adams 14 x 5' Geared Head
Davis 14 x 6' Q.C.
Hendy 14 x 6' M.D. Taper Attachment
Lodge & Shipley 14 x 8' M.D.
Porter 14 x 8' M.D.
Lodge & Shipley 16 x 8' Q.C. M.D.
South Bend 16 x 10' M.D. Q.C. Taper Attachment GAP
Sidney 17 x 8' M.D. D.B.G. Taper Attachment

TURRET LATHES
Gisholt—21"—2" thru spindle
Gisholt—5¾"—2" thru spindle

GEAR CUTTERS
26" Brown & Sharpe
G.&E. 3x36" Spur
G.E.E. 36"

DRILLS
Foote-Burt Heavy Duty
Eberhardt—24". Sliding Head

MILLERS
1—#3 Garvin Duplx, Table Cap. 12 x 64"
2—#7 Becker Production
1—#2 Cincinnati Plain Miller, with dividing head
3—#12 B & S

GRINDERS
Modern—16" x 60" M.D.

SHAPERS
1—10" G & E M.D.
1—24" Rockford, M.D.

BORING MILLS
4" Single Pulley Driven — Bickford Horizontal
2" Binsee, Horizontal
40" Bickford, Vertical

AUTOMATICS
1—#53 National Acme
1—2¼" Gridley Single Spindle
1—1¼" Gridley 4 Spindle, Model G
1—2¼" Gridley 4 Spindle M. D.

GENERAL
66E Niagara Power Press
American Planer—36" x 36" x 8'. 2 Heads on Rail M.D.
George A. Ohl Power Shear—10' 14 Gauge
#17 Williams & White Heavy Duty Punch, M.D. 36" Throat
10", 12" and 14" Newton Slotters
16" Beasley Ball Bearing Grinder
3—Form Rolling Machines (5 Sets of Form Rollers
1—Heller Motor Driven Cold Saw with 24" Blades and 1 Machine to Grind Saws for Same
Thompson Spot Welder—50 KVA Air Operated
Hydraulic Wheel Press with Pump, 150 Tons
Schatz Angle Shear—4 x 4 x ⅜"

Send Us Your list of Idle Machinery We will put it to War Work

S. & S. MACHINERY CO.
207 CENTRE STREET — Phone: WOrth 4-5710 — NEW YORK, N. Y.

SEARCHLIGHT SECTION

GUARANTEED USED MACHINE TOOLS

DRILLS

4 spdl. Sigourney (4)

4 spdl. Henry & Wright (19)

MILLERS

26" x 36" x 10' Ingersoll

26" x 25" x 12' Ingersoll

GEAR CUTTERS

No. 60BM Gould & Eberhardt Bevel Gear Rougher (2)

GRINDERS

(See page 311, Hill-Clarke Cylindrical grinders)

No. 40 Bryant Plunge Cut, Wide Wheel, Oscillating

No. 10 Lees-Bradner Spur Gear Grinder 1½" dia. New Yankee Drill Grinder

TURRET LATHES

18" Libby

HILL-CLARKE MACHINERY CO.
649 Washington Boulevard
Chicago, Illinois

OTT MACHINERY SPECIALS

AUTOMATICS, Gridley, 2¼, 3¼, 4¼ & 5⅛" S.S.
AUTOMATICS, Gridley, 1¼ & 2⅝" Model F.
AUTOMATICS, Cleveland, 1¼, 2 & 2½" Model B
AUTOMATICS, Cleveland, ⅞ & 2⅝" Model M
AUTOMATICS, Cone, 2½" 4 spdle. M.D.
AUTOMATICS, #22, 23 & 24 New Britain
AUTOMATICS, Cone, 2⅝" 4 spdle. M.D.
GRINDERS, Norton, 14x36" Plain, M.D.
GRINDERS, Heald Rotary Surface, 8" M.D.
GRINDERS, Landis, 6x18" Hydraulic, M.D.
LATHE, Putnam, 60"x17' with 12" Riser Blocks, total swing 85" M.D.
LATHE, 3x36" J.&L. Dble. Spdle.
LATHE, Sundstrand, 8" Stub, M.D.
MILLING MACHINES, Craftsman #1 & 2
PLANER, Gray, 42"x42"x12', 3 Heads, M.D.
PLANERS, Bedford & Patch, 36" x 13' Open Side with 1 Rail & 1 Side Head
PRESSES, Toledo, #34 Solid Back, S.G.
PRESSES, Toledo, #2 to 5 Open Back Inclinable
PRESSES, Ferracute, P2, 3 & 4, Solid Back

OTT MACHINERY SALES, INC.
542 Second Ave. Detroit, Mich.

LATHES

18" x 6' American Grd. Hd. 8 speed M.D. turret on shear Q.C.
24" x 18' New Haven, Semi Q.C. Cone drive.
40" x 20' McCabe Lathe, Cone Drive, Trip. Grd.
56" x 18' Putnam Turning Lathe, Belt feed.

GRINDERS

#14-20" Besley Disc Grinder.
Fitchburg Spline Shaft Grinder.
#55 Heald Cylinder.

MILLERS

#1 P & W Hand Miller.

GEAR MACHINERY

18" Gleason Bevel Gear Generators.
6" Bilgram Bevel Gear Generator.
18H Gould & Eberhardt Gear Hobber.
#1 Adams Gear Hobber.
#4—36" B & S Automatic Gear Cutter.
Lees Bradner Gear Grinder.
#3-26" B & S Gear Cutter.

BORING MILLS

42" Colburn, Turret head and plainhead.

PLANERS

24" x 6' Cincinnati Planer.

MISCELLANEOUS

14" Niles Slotter.
1500# Bell Steam Hammer.

CINCINNATI MACHINERY & SUPPLY CO.
217 East Second Street Cincinnati, Ohio

MISCELLANEOUS MACHINES

Rockford Sgl. End Hydr. Boring Machine with 2-sta., 54" dia. table
6' Niles Pl. Radial Drill
3' Carlton Sensitive Radial, tapping attach.
4-spdl Henry & Wright H.S. Drill
Gisholt Cutter Grinder, arr. M.D.
10x10" Napier Metal Band Saw
½" Shuster Auto. Cut. & Straight. Machine

STRONG, CARLISLE & HAMMOND COMPANY
1392 West 3d St. Cleveland, Ohio
2832 E. Grand Blvd. Detroit, Mich.

LATHES

14"x6' Lodge & Shipley
16"x6' Lodge & Shipley
17"x10' LeBlond
18"x14' Whitcomb Blandell
No. 324 Adriance Spinning

MILLING MACHINES

2" Pratt & Whitney spline (duplex) (Double)
No. 1 Foote-Burt Surface Broach
New No. 3 Wigglesworth
No. 2 Knight Vertical

TURRET LATHE

Goss & De Leeuw Chucking, 6"x6½"

DRILLS

No. B16 Natco M.D.
3'-9" Canedy-Otto Radial
4 Spindle Taylor & Fenn M.D.

GEAR MACHINERY

6 Cimatool chamfering M.D.
Lees Bradner Gear Grinders (2)
9" Pratt Whitney Gear Grinder
11" Gleason Bevel Gear Generator

MISCELLANEOUS

8" Bullard Multimatic M.D.
No. 1 Foote-Burt Duplex Surface Broach
21'x21"x5' Whitcomb Planer
24x24x8 Whitcomb Planer
36"x36"x8' Woodward & Powell Planer Rev. M.D.
No. 303 Bliss St. Side Gd. M.D.
2" Acme Bolt Threader

WIGGLESWORTH MACHINERY CO.
203 Bent St., Cambridge, Mass.

Cincinnati No. 5 Plain Miller S.P.D.

GRINDERS

Landis 12x36", 16x5, self-Cont., M.D.
Modern 10x24", 14x42", M.D., Norton 16x50"
Pratt & Whitney 14", B.B. M.D.
Norton 50"x28' Roll, M.D.
Heald No. 55, 60.

LARGE LATHES

36"x17' Pond, Grd. Head, M.D.
38"x32' Cleveland Engine, Grd. Head, M.D.
48"x12' Harrington Gap. sld. bed.
26"x13' Boye & Emmes
26"x14' Rahn-Larmon raising blocks to 34"
24"x14' Rahn-Larmon
40"x20' McCabe

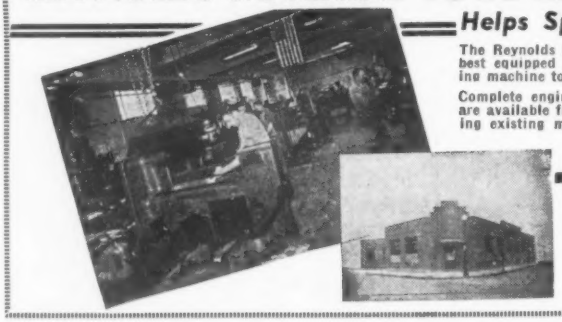
AARON MACHINERY CO.
45 CROSBY STREET NEW YORK, N.Y.

BORING MILL, Horiz. 4¼" bar Table Type.
PRESS, Dbl. Crk. 95-B Toledo, Dbl. Geared.
GEAR PLANERS, Bevel, 36" & 54" Gleson, M.D.
GRINDER, 18' x 30' x 96' Norton C 1., M.D.
PRESS, Toggle No. 14 Bliss, stroke 18".
PRESS, Hydr., 1000 ton Wood, platen 42" x 9'.
SLOTTER, 48" Morton, Portable, M.D.
STRAIGHTENER, Tube Torrington, cap. ¼"-⅝".

LANG MACHINERY COMPANY
28th St. & A. V. R. R. Pittsburgh, Pa.

REYNOLDS MACHINE TOOL REBUILDING . . .

Helps Speed War Production



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Complete engineering and manufacturing facilities are available for modernizing, motorizing and placing existing machine tools in condition for maximum production demands and highest accuracy.

REYNOLDS MACH'Y CO.
211 Eddy St.
PROVIDENCE, R. I.
Phone: Gaspee 5187

YOU CAN NOW HAVE YOUR NORTON GRINDERS MODERNIZED AND MOTORIZED

WE ARE IN A POSITION TO TAKE ON A LIMITED NUMBER OF THESE AT THE PRESENT TIME

SEE GRINDER AD ON PAGE 311

HILL-CLARKE MACHINERY CO., CHICAGO, ILL.

Phone: Haymarket 7660 **Cable Address: "Remand"** **651 Washington Blvd.**

EMERMAN offers

SLOTTERS to solve your Production Problems

1—10" New Haven
1—18" Dill
2—18" Niles
1—18" New Haven

These slotters are available for your immediate inspection at any time within your convenience.

Our capable engineers will gladly help you solve your problems.

Wire — Write — Phone

LOUIS E. EMERMAN & CO.

875 W. 120th St. **Chicago, Ill.**

500# B&S Board Drop Hammer.
800# B&S Board Drop Hammer.
#14 Cochrane-Bly Vert. Miller & Shaper, M.D.
50" G & E Gear Cutter.
#55 Heald Internal Grinder.
10' Bridgeport Knife Grinder.
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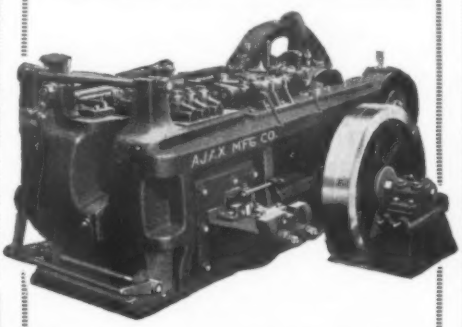

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I'm tellin' you..

No. 7 in a series of tips on "Keeping 'em Turning" by Jimmy Slevins, over 40 years at LeBlond

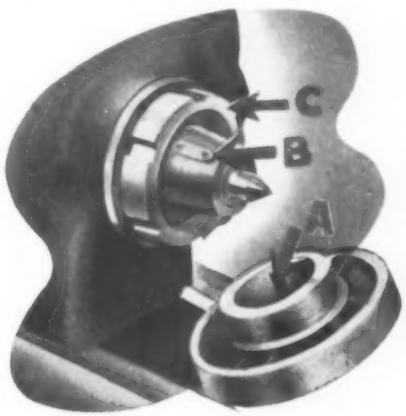
USING A CHUCK

Generally speaking, a chuck is used when the piece to be machined is irregular in shape; large in diameter in proportion to its length; so long as to require its being passed through the spindle; or when it is to be bored or drilled on the lathe axis.

On many lathes more than seven years old, there is a threaded spindle which requires some special handling when you put on or take off a chuck. On today's modern lathe this thread has been replaced with a standard taper spindle nose. Here is the procedure for putting on both types.

TAPER SPINDLE NOSE

Simply place chuck on spindle nose with slot (A) fitted over key (B). This leaves both hands free to start and tighten collar (C). On or off the operation takes 12 to 15 seconds and is practically fool-proof.



OLD TYPE THREADED SPINDLE NOSE

Don't put chuck on with the lathe running. It is dangerous to the operator and bad for the thread.

Hold chuck up to nose and revolve spindle by hand until engaged, then run chuck on by hand. If the chuck is too heavy for steady handling, place on a board across wings of carriage, using the board as a lever to raise chuck in alignment with threaded nose.

Another good practice is to put a large washer made of blotting paper between spindle shoulder and chuck plate. This may seem amateurish, but it helps to compensate for sticking threads which is one of the disadvantages of this old type nose.

ARMY E NAVY

THE R. K. LeBLOND MACHINE TOOL CO.

CINCINNATI, OHIO

Give your machines extra capacity for Victory through increased use of Timken Bearings. It will give you an edge on post-war competition, too.

The Monarch Machine Tool Company, one of whose Timken Bearing Equipped heavy duty lathes is shown in the photograph, knows that the more Timken Tapered Roller Bearings there are in a machine, the better its performance and the greater its endurance.

Look at that work turning—steady as a rock. That means maximum spindle rigidity; you've got to have it nowadays—especially when using cemented carbide tools.

The machine designer who constantly recognizes the advantages of Timken Bearings, is giving his company full value for his services, because he is not only assuring better machine *performance* but also greater *salability*—for the name "TIMKEN" is a sign of superiority to equipment buyers everywhere.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

HELP ASSURE VICTORY

Buy War Bonds. Conserve Rubber. Eliminate Unnecessary Travel. Use the Telephone Only When Important. Salvage All Scrap and Waste Material.

All Timken Bearing production now goes into fighting machines. However, the Timken Bearings in your motor vehicles or industrial machines will see you through the emergency—and beyond it—if you make sure they are lubricated and inspected regularly.

TIMKEN

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TAPERED ROLLER BEARINGS

Manufacturers of Timken Tapered Roller Bearings for automobiles, motor trucks, railroad cars and locomotives and all kinds of industrial machinery; Timken Alloy Steels and Carbon and Alloy Seamless Tubing; and Timken Rock Bits.